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ABSTRACT

This document contains the proceedings of the International Best of Both Worlds Conference presented by the University of South Africa, Vista University, and the South African College of Education. Papers include: (1) "A Strategy for the Implementation of Environmental Education in the Intermediate and Secondary School Phases in South Africa" (Bornman, G.M.); (2) "Environmental Education and Education for Survival" (Carlson, Ulaf; Mkandla, Strike); (3) "Major Constraints in the Development of an Instrument To Assess the Three Levels of Environmental Literacy of Teachers" (Chacko, C.C.); (4) "Exploring Common Grounds for Environmental Education in the U.S. and Pakistan To Make Recommendations for Negotiating Barriers in Pakistan: A Comparative Study" (Daudi, Sabiha S.); (5) "E.A.S.Y. Programme (Environmental Award System for Youth)" (De Bruin, Dee; Barnes, Barry; Barrowman, Cherie; Gajathar, Radika); (6) "University Environmental Policy: An Overview of the Environmental Education Teaching, Researching and Extension Programs and Administrative Activities at the Federal University of Sao Carlos (Sao Paulo State, Brazil)" (Torres de Oliveira, Haydee; Arantes do Nascimiento Teixeira, Bernado); (7) "Using the World of the Dead to Learn about the World of the Living: 'A Museum Comes to Life through Environmental Education'" (Dreyer, Johann); (8) "Children's Conception of Environment in the Primary School" (Eloranta, Varpu; Antila, Niina; Heinonen, Petra); (9) "Urban Agriculture Course at Technikon SA: An 'Ecolative' Approach" (Gaum, Wilma G.); (10) "Environmental Education--An Industrial Perspective" (Govender, Troy); (11) "The Contribution That Technology Can Make as a Field of Study in Developing Learners to Interact Meaningfully with the Environment" (Gumbo, Mischack); (12) "Environmental Education for All--Including the Learners with Special Educational Needs" (Hugo, Anna J.); (13) "The Development of an Environmental Education Research Directory for Southern Africa" (Irwin, Pat); (14) "Native African Tribes and the African Environment" (Jordaan, Johannes H.); (15) "Wild, Wonderful Wyoming: Choices for the Future" (Rizor, David; Keown, Duane); (16) "Population Education for the Global Family" (K'oywa, Cyprian Othieno); (17) "Economy in Transition as a Bridge for Transfer of Know-How between the Worlds--Case Study: Pollution Prevention" (Kuras, Mecislav; Dobes, Vladimir); (18) "Community Understanding of Biodiversity and Ecological Relationships--The Basis for Implementing ESD Principles"

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(Lehmann, Peter); (19) "USP RECICLA; From Pedagogics to Technology: A Waste Minimization Programme" (Leme, Patricia); (20) "Integrating Environmental Education across the Curriculum in Higher Learning" (Little, R.L.); (21) "Third World South African Scholars: Social and Environmental Problems in the Nineties" (Lombard, Marilise); (22) "Effective Environmental Strategies for Sustainable Development" (Londhe, G.D.); (23) "Microscale Water Quality Test Kits: A Bridge between the 'Pre-Modern' and 'Western' Worlds for Environmental Educators?" (McKay, Ian); (24) "Outcomes and Indicators of a Successful Environmental Education Program" (Machado, Kathy); (25) "The Conflict between Conservation and Basic Human Needs" (Matjokana, W.); (26) "Community Development the Key to Sustainable Environmental Education" (Mearns, K.F.); (27) "Environmental Aspects of Concern in the Public Administration of South Africa" (Nealer, E.J.); (28) "Communities in South Africa and the Development of an Acceptable Environment" (Odendaal, S.C.C.); (29) "Indigenous Myth, Story and Knowledge in/as Environmental Education Processes" (O'Donoghue, Rob; Board, Natal Parks; van Rensburg, Emeta Jan Se)); (30) "Environmental Science and Rural Development: The Case of the Curriculum of the School of Environmental Sciences, University of Venda" (Omara-Ojungu, P.H.); (31) "Environmental Education and Research in Teacher Education in Finland--Different Aspects and Future Visions" (Palmberg, Irmeli E.); (32) "Border Crossings in Environmental Education: Backing the Best of Both Worlds" (Plant, Malcolm); (33) "Technology Education: Enhancing the Best of Both Worlds" (Potgieter, Calvyn); (34) "The Socio-Ecological Crisis and Education for Sustainable Living: Is an Essentialist Standpoint Possible?" (Robinson, John; Shallcross, Tony); (35) "Environmental Education: At The Cross-Road of Theory and Practice" (Schaller, E.M.J.); (36) "Education for Environment and Sustainability" (Scoullos, M.); (37) "Outcomes Based Education versus the 'Old' Approach: Using the Best of Both in Environmental Education?" (Schulze, Salome); (38) "Researching Participation and Participating in Research; Essential Dimensions of Education for Sustainability?" (Shallcross, Tony; Robinson, John; Nichol, Robbi); (39) "EcoSchool: An ESD Approach: A Curriculum and Lifestyle Program for Australian Schools" (Smith, John H.); (40) "Philosophical, Epistemological, Doctrinal and Structural Basis for an International Environmental Education Curriculum" (Subbarini, Mohammad S.); (41) "Environmental Education in Tourism--A Comparison between Canada and Japan" (Telfer, David J.; Hashimoto, Atsuko); (42) "Environmental Education in Thailand: Reproduction and Reformation" (Thathong, Kongsak); (43) "The Relevance of Environmental Education to the OBE Curriculum 2005 in South African Schools" (Vakunta, Peter Wuteh); (44) "Creating Environmental Perspectives in a Developing Community" (van der Linde, C.M.); (45) "Education in South Africa's Curriculum 2005: Developments and Challenges" (van Rooyen, H.G.); (46) "Environmental Education for the Early Years: All about Me and My Skin, as Examples of Programme Organisers To Engage Young Children in Inquiry and Exploration of Their Environment" (van Staden, C.J.S.); (47) "The Contribution of Environmental Education to Sustainable Development" (Veneti, Athena); (48) "South Africa and the Environmental Challenge" (Campillo, Maria Vidaurreta); (49) "Using the Environment To Enable Learners with Special Educational Needs (Behavior Problems) To Actualise Their Potential" (Weeks, F. H.); (50 "Quality Housing Education--Foundation for a New Paradigm To Effect Responsible Environmental Ethics in West Africa" (Willington, D. M. Nii-Aziri); and (51) "Participatory Search for Eco-Friendly Solutions to Development Needs of Some Narribian Communities" (Zimmermann, Ibo). (CCM)

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# Proceedings of the International Best of Both Worlds Conference

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Pretoria, South Africa

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# International

# Best of Both Worlds Conference

presented by

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## LIST OF CONTENTS

**Key note address: Prog George Dawson** .......... iv

1. **A strategy for the implementation of EE in the intermediate and secondary school phases in South Africa** - GM Bornman, University of South Africa .......... 1
2. **Environmental Education and Education for Survival** - *Mr Ulf Carlson and Dr Strike Mkandla, UNEP - Kenya* .......... 5
3. **Major Constraints in the Development of an Instrument to Assess the three Levels of Environmental Literacy of teachers** - C C Chacko, Marapyane College of Education, South Africa .......... 12
4 **Exploring common grounds for environmental education in the US and Pakistan to make recommendations for negotiating barriers in pakistan: a comparative study** - Sabiha S. Daudi, Ohio, USA .......... 17
5. **E.A.S.Y programme (Environmental Award System for Youth)** - Mrs Dee De Bruin, Barry Barnes, Cherie Barrowman, Radika Gajathar, Keep Pietermaritzburg Beautiful .......... 27
6. **UNIVERSITY ENVIRONMENTAL POLICY: an overview of the environmental education teaching, researching and extension programs and administrative activities at the Federal University of São Carlos (São Paulo State, Brazil).** - Dr. Haydée Torres de Oliveira1 and Dr. Bernardo Arantes do Nascimento Teixeira2, Federal University of São Carlos -BRAZIL .......... 31
7. **Using the world of the dead to learn about the world of the living : "A museum comes to life through Environmental Education"** - Johann Dreyer, University of South Africa .......... 35
8. **Children's conception of environment in the primary school** - Dr, Ms Varpu Eloranta, Ms Niina Antila & Ms Petra Heinonen, Department of Teacher Education, University of Turku, Finland .......... 40
9 **Urban agricultural course at Technikon SA: An "ecolative" approach** - Wilma G Gaum Applied Natural Sciences, Technikon SA, South Africa .......... 48
10. **Environmental education - an industrial perspective** - Troy Govender, Senior Environmental Advisor, Eskom, South Africa .......... 56
11. The contribution that technology can make as a field of study, in developing learners to interact meaningfully with the environment - Mr Mischack Gumbo, Technikon SA, South Africa .......... 59
12. **Environmental education for all - including the learners with special educational needs** - Anna J. Hugo, University of South Africa, South Africa .......... 64
13. **The development of an environmental education research directory for Southern Africa** - Prof. Pat Irwin, Rhodes University, South Africa .......... 70
14. **Native African tribes and the African environment**- Prof. Johannes H. Jordaan, University of South Africa, South Africa .......... 75
15. **Wild, Wonderful Wyoming:Choices for the Future** - David Rizor and Duane Keown, Univeristy of Wyoming, USA .......... 81
16. **Population education for the global family** - Cyprian Othieno K'oywa, Sonbo, Kenya Cyprian Othieno K'Oywa .......... 86
17. **Economy in Transition as a Bridge for Transfer of Know-how between the Worlds - Case Study : Pollution Prevention** - Mecislav Kuras(1) and Vladimir Dobes(2) - Czech Cleaner Production Centre,Prague, Czech Republic .......... 90
18. **Community Understanding of Biodiversity and Ecological Relationships - The Basis for Implementing ESD Principles** - Peter Lehmann, Greening Australia (South Australia) .......... 93
19 **USP RECICLA: from Pedagogics to Technology: A waste minimization programme** Patricia Leme, University of Sao Paulo, Brazil .......... 100
20 **Integrating environmental education across the curriculum in higher learning** - R.L. Little, Technikon Northern Gauteng, South Africa .......... 102
21. **Third world South African scholars: social and environmental problems in the**

**nineties** - Mrs Marilise Lombard, Vista University, Pretoria , South Africa ............... 112

22. **Effective Environmental Strategies for sustainable Development** - Dr. G.D.Londhe , College Ahmednagar, Aghmednagar , India ............................................ 115

23. **Microscale water quality test kits: a bridge between the "Pre- modern" and "western" worlds for environmental educators?** - Ian McKay, RADMASTE Centre, University of the Witwatersrand, Johannesburg, South Africa ........................ 118

24. **Outcomes and Indicators of a Successful Environmental Education Program** - Kathy Machado, Santa Clara Valley Water District, California, USA .................. 127

25. **The conflict between conservation and basic human needs** - .W. Matjokana ........ 130

26. **Community development the key to sustainable environmental education**. Mearns, K. F. Vista University, South Africa ........................................ 140

27. **Environmental aspects of concern in the Public Administration of South Africa** - Dr EJ Nealer, University of South Africa ........................................ 144

28. **Communities in South Africa and the development of an acceptable environment** - Odendaal S. S. C., Vista University, South Africa .............................. 153

29. **Indigenous myth, story and knowledge in/as environmental education processes** - Rob O'Donoghue, Natal Parks Board and Eureta Janse van Rensburg, Rhodes University, South Africa ................................................ 158

30. **Environmental science and rural development: the case of the curriculum of the School of Environmental Sciences, University of Venda** - Prof P.H. Omara-Ojungu Dean: School of Environmental Sciences, University of Venda ................. 170

31. **Environmental education and research in teacher education in Filand - different aspects and future visions** - Irmeli E. Palmberg, Åbo Akademi University, Vasa, Finland ........................................................ 172

32. **BORDER CROSSINGS IN ENVIRONMENTAL EDUCATION: backing the best of both worlds** - Malcolm Plant, Nottingham Trent University, UK ...................... 178

33. **Technology Education: Enhancing the Best of Both Worlds** - Calvyn Potgieter, Department of Further Teacher Education, University of South Africa ................. 184

34. **The socio-ecological crisis and education for sustainable living: is an essentialist standpoint possible?** - John Robinson, Manchester Metropolitan University, England and Tony Shallcross, Moray House Institute of Education, Edinburgh, Scotland ......... 198

35. **Environmental education: at the cross-road of theory and practice** - E M J Schaller, South African College for Teacher Education, PRETORIA South Africa ........................................................ 212

36. **Education for Environment and Sustainability** - Prof. M. Scoullos, University of Athens, DTP of Environmental Chemistry, Chairman of MIO-ECSDE ........................ 215

37. **Outcomes Based Education versus the "old" approach: Using the best of both in Environmental Education?** - Salomé Schulze, Unisa ..................... 218

38. **Researching Participation and Participating in Research; Essential Dimensions of Education for Sustainability?** - Tony Shallcross, Moray House Institute of Education (MHIE), Edinburgh and John Robinson, Manchester Metropolitan University and Robbi Nichol (MHIE) ................................................ 227

39. **EcoSchool: An ESD Approach: A curriculum and lifestyle program for Australian schools** - John H Smith, Australian Association for Environmental Education . 238

40. **Philosophical, epistemological, doctrinal and structural basis for an internatonal environmental education curriculum** - Mohammad S. Subbarini , Yarmouk University, Jordan ................................................ 242

41. **Environmental Education In Tourism** - A Comparison Between Canada and Japan - David J. Telfer and Atsuko Hashimoto ......................................... 247

42. **Environmental education inThailand: Reproduction and reformation** - Kongsak Thathong , Faculty of Education, Khon Kaen University, Thailand ............. 254

43. **The relevance of environmental education to the OBE curriculum 2005 in South African schools** - Peter Wuteh Vakunta ................................. 260

44. **Creating environmental perspectives in a developing community** - Mrs CM van der Linde, Department of Chemistry, Technikon Northern Gauteng ......... 273

45. **Education in South Africa's Curriculum 2005: Developments and challenges** - Prof H G van Rooyen, Department of Curriculum Studies, Rand Afrikaans University, South Africa ........ 278

46. **Environmental Education for the Early Years: ALL about me and My skin, as examples of programme organisers to engage young children in inquiry and exploration of their environment** - Dr CJS van Staden, Department of Primary School Teacher Education, UNISA ........ 294

47. **The Contribution of Environmental Education to Sustainable Development** - Athena Veneti, [Biochemist, Educator of Environmental Education], Greece ........ 303

48. **South Africa and the environmental challenge** - Maria Vidaurreta Campillo, Universidad Nacional de Educacion a Distancia (UNED), SPAIN ........ 307

49. **Using the environment to enable learners with special educational needs (behaviour problems) to actualise their potential** - F.H. Weeks, Department Primary School for Teacher Education, University of South Africa ........ 322

50. **Quality housing education-foundation for a new paradigm to effect responsible Environmental ethics in West Africa** - Prof. D. H Nii-Aziri Wllington, Visiting scholar, Dpt.of Hme Sience, University of Ghana, Lgon ........ 334

51. **Participatory search for eco-friendly solutions to development needs of some Namibian communities** - Ibo Zimmermann, Department of Natural Resource Management and Tourism, Polytechnic of Namibia,WINDHOEK, Namibia ........ 341

**Key note address: Prof George Dawson**

Paper Presented to the Best of Both Worlds Conference
March 23, 1998
Pretoria, South Africa
By

George Dawson
Professor, Science Education and
Director, Interactive Media Science Projects
Florida State University

## Introduction

It is a real pleasure to be here at this conference. The setting and the topic will make this event one that we all will refer to for the rest of our lives. There are some conferences that are watersheds in our lives. That is, they have an impact on the way we think and the way we behave for the remainder of our lives. This conference promises to be such a life changing event.

The organizers have done an amazing job just to get you here and to have such an impressive array of people participating. You must all thank Josef de Beer, Callie Loubser and the many others who have given of their time to make this program a success. You will have plenty of opportunities to do this as we will be seeing a lot of them over the next few days.

The purpose of this presentation is to share with you some experiences, past, present and future that may give you something to think about, and hopefully use, as you go back to your jobs at the end of this week.

I have had the good fortune to work at a number of locations around the world for a variety of reasons. When I am outside my office, whether it be on the way home, walking a trail in Costa Rica, or on a beach in Tahiti, I take in the view through the eyes of one interested in the environment. That view is also seen through the glasses of an educator. However, in too many places I see that we are not taking care of our natural heritage. What I see is a real need to educate people about degradation of our environment and to encourage them to take action. There are those, and you are among them, who use the tools and the position that they have available to them, to make things happen. One such person is Carl Hiaasen, an investigative reporter writing for the Miami Herald about the environment. He speaks of the 60 percent of the Florida wet lands that have been drained for development. "It's a disaster we don't think about as a crime, but it is. There are counties and politicians who are always willing to rollover for a developer. Since the turn of the century Florida acreage has been the Golden Currency." Local policy makers show no inclination to save much of the coastline or green space. What he speaks of next is what gives me and, I expect, you, a reason to continue our work. He states "There are pockets of sanity and tranquility where somebody sane and with a reverence for nature has prevailed, but it usually is a refuge or park." I would like to share some of those pockets of sanity with you.

In 1991, my wife and I met a woman who was running an environmental center just off Arbat street in Moscow. She started this as an after school project in an attempt to get students to become more involved in solving environmental problems in their country. She was appalled at the environmental damage that was being done in the Soviet Union. She was, and is determined to make a difference in the attitudes of the government regarding the environment and spends many hours of her time outside of her regular teaching. She gets no support from any public sector but somehow keeps the center open with volunteers.

As concern for the environment began to generate global interest other parts of the world began efforts to educate their citizens. I had the pleasure of assisting the Arab League in 1974 in developing a framework for environmental education for the Arab world. This effort, headquartered in Cairo, Egypt resulted in a program that was used in much of the Middle East. All of these programs relied on print and some field experiences as the media of delivery.

My tools and skills that I can apply to the struggle are in the area of curriculum development. I want to share with you some things that have happened in the past that I think have been major turning points in my professional life and that have affected my contributions.

One was a response to Sputnik. As a science educator I give thanks to the Soviets frequently because their placement of this satellite in orbit made the U.S. recognize how far behind we were in our teaching of science. The interest in changing the situation resulted in a period of time known as the Golden Age of Curriculum Development. The Biological Science Curriculum Study produced a upper secondary biology program know as the Green Version. This program was known in many countries as The Web Of Life. This version was radically different from the existing biology texts. It stressed ecology rather than the simply learning the names of the parts of plants and animals. The major textbook at that time was a program called Modern Biology. It had about 95% of the sales for this level in the U.S. It focused on naming tissues and organs which required the memorization of some 4,000 new terms. The Green Version introduced the notion of inquiry. This change put the focus on learning using the processes of science rather than just being able to define a term. Let me illustrate the difference. Take time to rub your hands together real fast. Why are your hands getting hot? If you answered friction, I would give you a failing grade on a test. You would have received an A in Modern Physics which is a companion to Modern Biology. Why the F? I asked **why** your hands got hot and that word, friction with which you probably responded, may or may not tell me that you understand why your hands got hot. My experience is that most of us do not understand how rubbing our hands together releases heat. What the BSCS stressed was learning for understanding, not just memorizing terms.

The second important thing about the BSCS is that it took an ecological approach to the learning of biology. The environment was the central focus and was integrated into every topic of biology. I went from a field test teacher of pre-publication versions of the Green Version to working on a number of their development efforts. This experience changed my approach to how I taught everything.

Another project taught me to rely more on the creativity of my students. This program was called Environmental Science and was radically different from anything then or now on the market. And I add that it was controversial. It turns out that the Environmental Science project was as much for changing the classroom environment as much as it was about the great outdoors. Here is an example assignment from the program.

> The Action: Go outside and find as many different kinds of eggs as you can and bring them back.
> More:
> - Try to keep the eggs alive, hatch them, and then keep the young animals alive
> - Can the animals be raised?
> - Find some "eggs" of social change. How can they be kept alive? Do they all hatch and live?
> - Predict what would happen if all the eggs hatched and reproduced.
> - What does it mean to be an egg?

- Collect photos of many different eggs, then make a montage of them.

The entire program for one year consisted on 100 of these cards! ES students were expected to apply their unique interests and abilities to solving a problem or pursuing an issue. And their contributions were valued. This valuing of each individual is so important. We in the U.S. struggle with the challenge of educating a diverse student population and perhaps a program like this should be reexamined as a tool for reaching a wider range of students.

I once created a list of what I would wish for any school kid to do as part of their education. At the top was "Spend their formal education out of doors." If this is not possible then as much of it as possible would be supplemented by laboratory experiences. My least attractive choice would be to put them in a classroom listening to lectures and answering questions at the end of the chapter. An interesting aside here is that we once surveyed a rather large number of students around the U.S. and near the top of their list of concerns was that of the destruction of the environment. On the other hand, one of their favorite leisure activities was to go to malls and hang out! This wish list was made soon after I finished a three year masters program in biology that was heavy on field experiences. There is considerable evidence that hands-on, minds-on, and as my good friend Josef De Beer stated so well, hearts on, teaching is highly desirable. Direct experience is clearly the way to learn (Kubota and Olstad) and I expect any environmental education program to be rich with these experiences.

Field experience is best but must be limited in most situations. Logistics get in the way. Getting transportation, worrying over the risks associated with having kids away from school and the problem of deciding who can go and who stays keep field trips from occurring. A secondary teacher may see 175 - 200 students a day. A teacher may be able to take 20 or 30 on a field experience. What happens to the others while this privileged group is gone for the day? We have a program at Florida State called Saturday at the Sea. It runs each Saturday for about 20 Saturdays a year. The program can take 20 students at a time, so at most 400 of the 25,000 students in our city can experience that trip each year. There are many good activities that can be done on a school ground but there is nothing like experiencing the natural environment. You can, of course, learn a lot about what not to do to an environment at or near most schools. There are also some wonderful programs for getting students into the out of doors. One that many of you may have heard of is Project Wild. The key to the success of this program is a cadre of teachers who volunteer to teach classes on weekends and holidays. They run initial and refresher courses for teachers. Their inservice model is one to consider if you are trying to implement a program into schools.

As I studied more about what an environmental education program should cover (I saw it initially only as ecology) I read a lot and talked to many people about the topic. A colleague of mine, Professor Lehman Barnes, and I did a survey on the campus of Florida State University in 1971 to try to determine who included environmental content in their programs. The purpose of this was to determine what interest their was in creating an environmental studies program. What we found is that nearly every discipline claimed the topic as their own. Since everyone claimed environmental education as theirs (I think many of them saw funding opportunities) I had real problems conceptualizing what the content on an environmental education program would look like. Fortunately, there were others who were grappling with the problem as well.

A seminal event in Environmental Education was the Tbilisi Conference held in Tbilisi, Georgia in 1978 then part of the Soviet Union. It is considered to be a turning point in the environmental education movement because it gave some direction and focus to the discipline . Two statements in the Role, Objectives and Characteristics of Environmental Education, were and are of interest to me. These are:

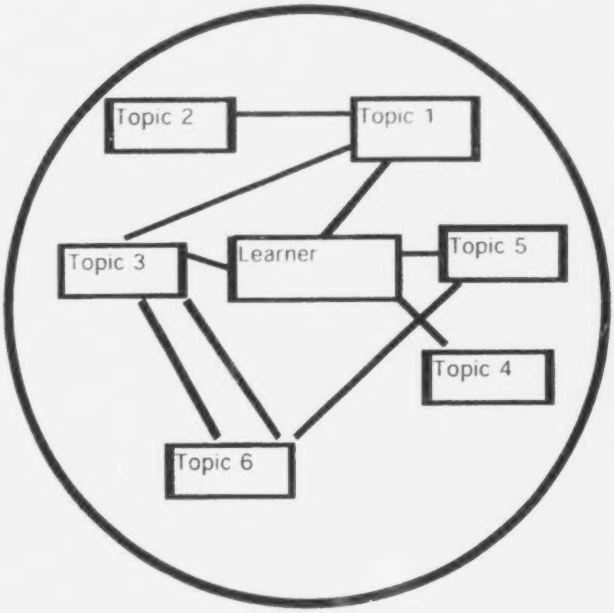
- Environmental Education should provide the necessary knowledge for interpretation of the complex phenomena that shape the environment, encourage those ethical, economic and aesthetic values which, constituting the basis of self discipline, will further the development of conduct compatible with the preservation and improvement of the environment; it should also provide a wide range of practical skills required in the devising and application of effective solutions to environmental problems.

- To carry out these tasks, environmental education should bring about a closer link between educational processes and real life, building its activities around the environmental problems that are faced by particular communities and focusing analysis on these by means of an interdisciplinary, comprehensive approach with will permit a proper understanding of environmental problems (Connect).

As I began to think about the limitations of a classroom and the problems of getting kids away from schools, I turned to technology.

## Role of Computers

Computer programs began to show up in schools in the U.S., Western Europe and in Japan in the late 70's. I bought my first computer, an Apple II in 1979 and saw my first program that simulated research shortly after that. The program was called Odell Lake. This was an important piece of software because students were required to use the science processes of observing, inferring and predicting. They also had to keep good records of who was eating whom and had to use their notes in order figure out the food web of Odell Lake. Another important feature was that the simulation was based upon actual research.



What I also saw during these early days of computer based programs was a lot of poor science programs that I would consider to be electronic page turners. Even with the crude graphics and other limitations of the computer, it was clear that this media had something to offer. I began to think about what a multimedia program about the environment would look like. I knew it should reflect, as nearly as possible, real events and issues and should be pedagogically sound. At that time I gave consideration to the advantages and disadvantages of various media. I have already spoken of the richness of field experiences although Kubota and Olstad show clearly that if the intitial visit is short, very little formal learning occurs. Print material is cheaper to produce and distribute and has portability. Visual media is more expensive to develop and use. Movies, video and audio tape, CDs all require equipment which limits it's use to those educational entities that can afford the media. This is a big disadvantage to much of the world. But even in the poorest of countries media such as the internet is used in some educational settings The numbers of schools connected to the internet in the U.S. is about 75% but only 27% of classrooms have connections (CNN report, 26 Feb., 1998). In Leon County, Florida (Tallahassee) all classrooms are linked to the internet. .

What caught my eye in the late 70's was that the computer would allow me create programs that were non - linear. All the materials that I had written up to that time were linear. You began on page one and went through the book page by page. "The world's current notion of literacy is based on the square book..." (Carlson). I saw the opportunity to create products that let the user not only go back and forth as you could in a book, but in any direction. I started working on materials that put the learner inside of a "Learning Sphere." Inside of a sphere you can go in any direction but you are bound by the diameter of the sphere. If you think of the sphere as the content you want to learn you have defined the boundaries for a course or a topic. Inside the sphere you can go in any direction. This idea became the basis of the design of all curriculum materials that I have prepared since then. Another thing to consider is that as you increase the diameter of the circle and reach out to bring in a wider spectrum of content the volume of the sphere increases as the cube of the radius! Non-linear programs have a natural tendency to attract additional content.

This also seemed to me to reflect how we work outside of a formal classroom setting. In our work, whether you are an ecologist in the field, a teacher, or a person in nearly any job except on an assembly line, you work in spherical realms. Today in this conference you are going to move more or less in linear paths as we are being moved from place to place - from here to lunch to Dikhololo and to the planned events there. But in your normal work you may write a while, decide to talk to a colleague or other experts about an idea, return to your writing, step outside to think, spend an hour in a seminar being given some information, walk to the library for a reference, step into the lab for a while to check on an experiment, and then go off to your study site to check on the movement of the troop of baboons that have settled near a village. What I wanted to do was to put students in a situation that more closely resembled the latter non-linear learning model. So a key feature of materials that I have developed is the notion of learner control. Early computer programs were written much like books but they had a disturbing, at least to me, characteristic. Most of them controlled the content and made the delivery of instruction more inflexible than did a textbook. A student, in order to move to new text had to answer questions. These had to be written exactly as the programmer expected, including the proper case and spelling. Frequently the student was faced with a screen that gave no feedback and did not let the person move. The Apple computer came along about that time and used a more graphical interface and had the power (48K of ram) to allow for a more flexible and user friendly interface, but the programs stressed rote learning and highly controlled the way a person went about learning. What I set out to do was to turn control over to the student rather than leaving it with a computer. Most of the programs at that time were built around an objectivist perspective, while I approached learning as a constructivist. An objectivist considers knowledge as separate from knowing, and learners acquire knowledge through the use of the senses (Lakoff, 1987). A constructivist (von Glasersfeld, 1989) assumes that knowledge cannot exist outside the body of a learner. This is not to say that physical events are not occuring, but the sense is made by humans and the sense making is negotiated by the participants (Tobin and Dawson). Any curriculum materials that I develop will be built on this model. This means that information will not be given to a student to accept as truth, but that they will have to discuss and make part of their knowledge scaffolds new information. If knowledge is can be thought of as a framework or scaffold, then the structure must change to accommodate new information. Making of meaning rather than acceptance of the meaning given by others is a central element of our development efforts.

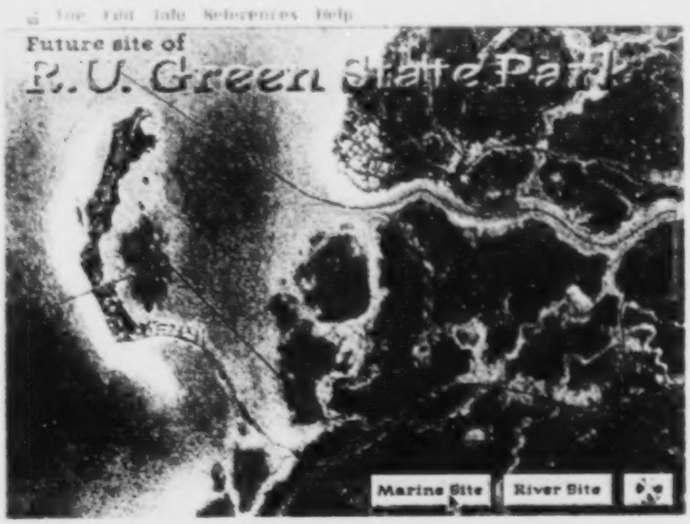
In 1987 I was fortunate to have received funds from our National Science Foundation to work on a multimedia program known as ScienceVision. One of the titles in the program was EcoVision which highlighted environmental problems and solutions world wide but focusing on the U.S. We learned a lot about the integration of multimedia and field experiences from this work. Some key people at the Florida Department of Environmental Protection had seen ScienceVision and then contracted with my project to develop EcoVentures.

**EcoVentures**

We have just finished the CD version of EcoVentures and I will share it with you now. It illustrates how we have brought our ideas together. The program that I will share with you is EcoVentures: Learning in Florida's Environment. Our team is currently working on a national version that should be ready for distribution by the end of this year.

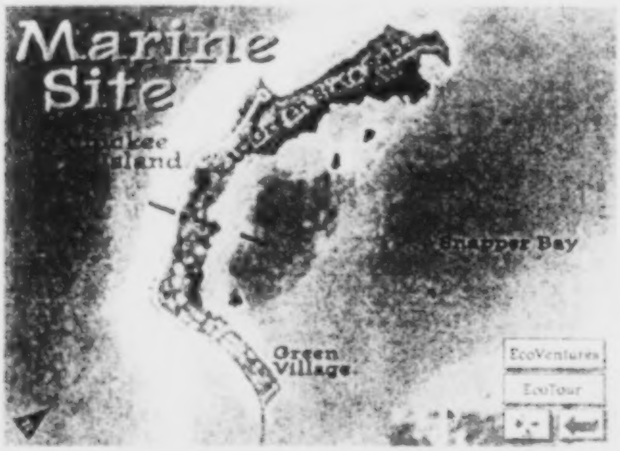
Money for the development of EcoVentures came from the Florida Department of Environmental Protection (DEP). The problem we wanted to address is that we have increasing pressure on our environmental resources due greatly to the 800 or so new citizens we gain each day. People are moving to our state for a number of reasons, many for our aquatic resources, yet we are destroying the very things that make Florida a desirable place to live.

We decided to create a fictitious state park. The lower secondary students for which this is intended are interns working with the DEP to develop a management plan for the new R.U. Green Park. Here is the opening screen for EcoVentures. It is an outline of the new park. Picture in your minds a similar park in your area. How would it look?



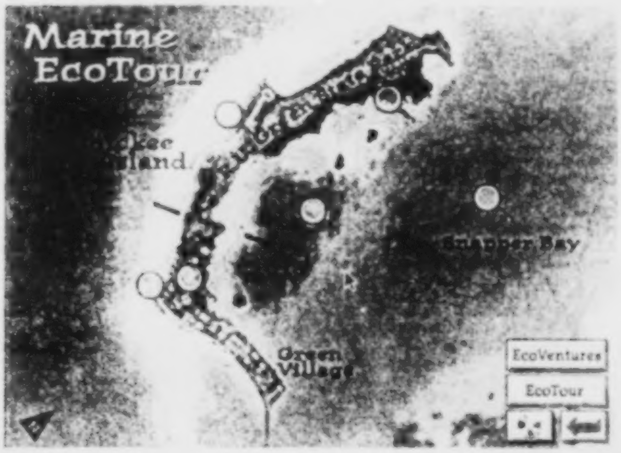
By selecting from the menu bar at the top of the screen or any of the three icons at the bottom right students can choose to explore elements of the program. In this article I will demonstrate all the major components while showing a typical path by a student using EcoVentures.

There are two major sections of the park, the Marine Site, including the bay and island, and the River Site. Selecting either of these icons takes you to the respective section of the program. The icon brings you to a 5 minute movie describing some of the environmental issues facing Florida, and introduces the five on-screen interns, called the EcoVenture Team. In our example we will explore some of the Marine site resources. Here is the screen the student sees when the Marine Site is selected.

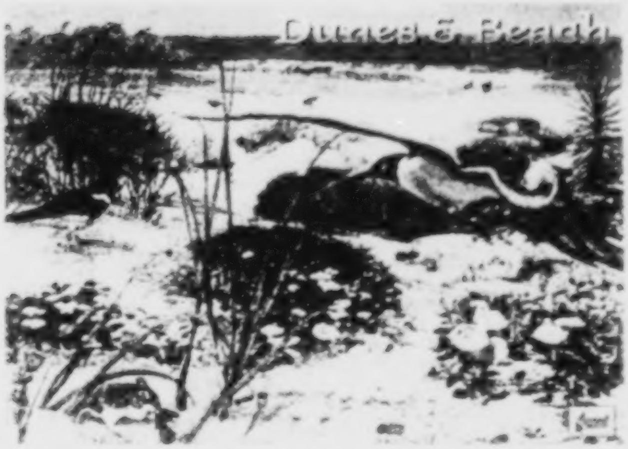

Marine Site
kee
Island
Snapper Bay
Green Village
EcoVentures
EcoTour

Note that there are some new icons on the screen. These are **EcoTour** and **EcoVentures**.

When the Ecotour icon is chosen a magnifying glass appears over the site screen marking the habitats where a student can go to observe and learn about organisms. There are a total of 15 EcoTours on the CD.

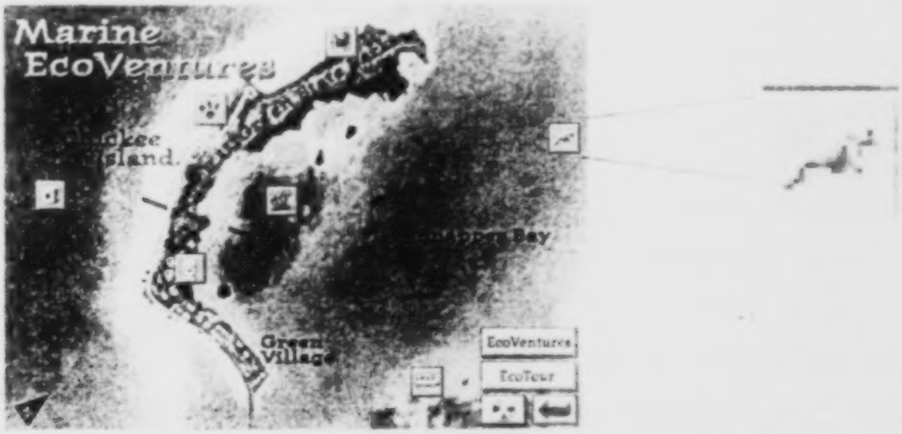

Marine EcoTour
kee
Island
Snapper Bay
Green Village
EcoVentures
EcoTour

Clicking on one of these brings up a screen with selectable objects.

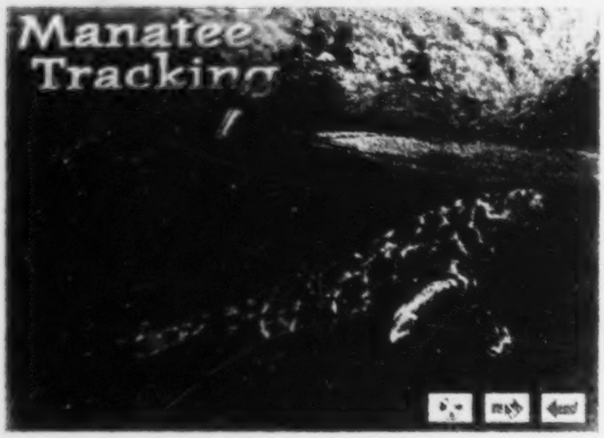


Pick any organism show on the screen and a slide or movie with text is displayed. There are about 700 pictures of Florida's wildlife on the CD available through these EcoTours and the illustrated Field Guides. These graphic resources give our students a good overview of what lives in the different habitats in our state.

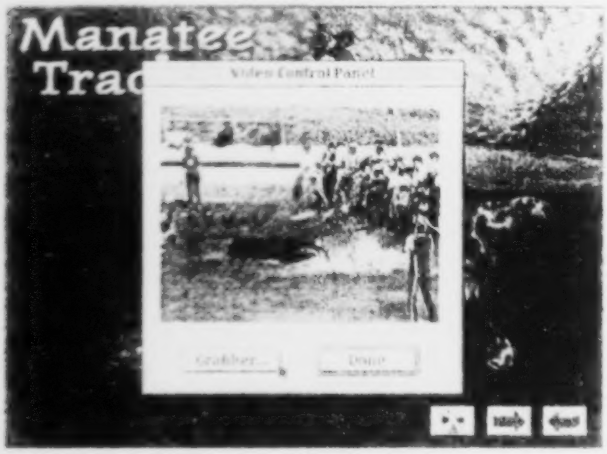
Selecting the **EcoVentures** icon leads us to the heart of our program. EcoVentures are the activities designed to give students an understanding of research being done that will lead to better understanding of our environment and to address some of the social issues related to protecting our very fragile home.



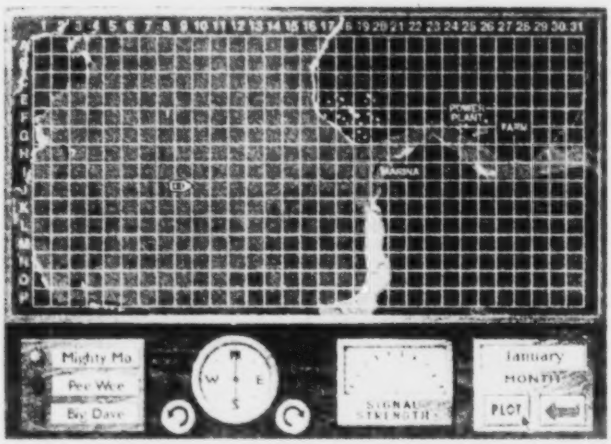
For illustrative purposes the activity Manatee Tracking will be selected and then described. Students do this activity to help them make recomendations about controlling boat traffic to protect the manatees



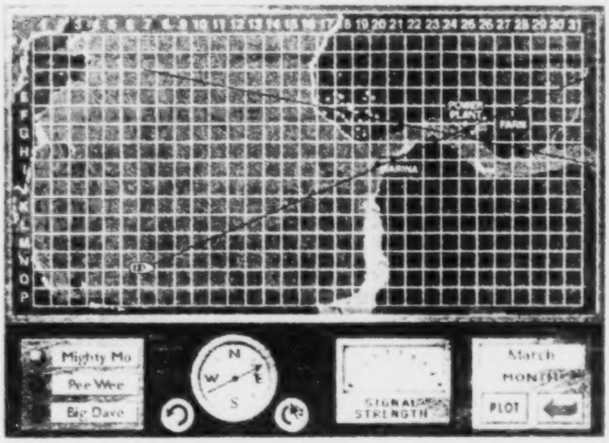
Here the student has three choices. They can look at a movie clip which shows how a manatee is captured and collared, move to the next screen, or move back to the prior screen (they can move to other screens by going to the menu bar at the top of the screen).



The forward arrow takes them to an instrument panel in their small research vessel. Their task is to track three manatees over the course of the year. This information will enable them to make decisions about how to protect them. There are an estimated 2600 of the endangered West Indian Manatees in the state. About 10% of them die each year from a variety of causes. Being cut or crushed by boats kills about 55 of them per year.


POWER PLANT
FARM
MARINA
Mighty Mo
Pee Wee
Big Dave
N
W
E
S
SIGNAL STRENGTH
January
MONTH
PLOT

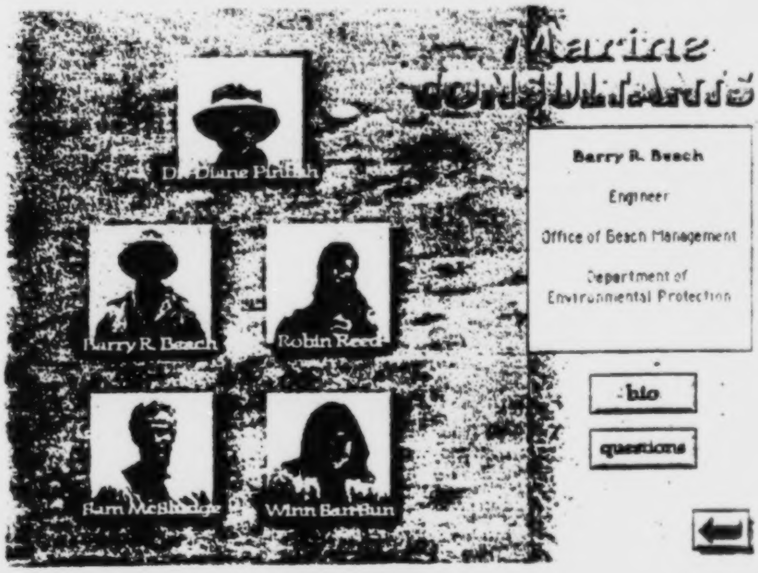
There are several decisions that have to be made at this point. The student must pick a month and a manatee to track. In order to locate the manatee they have to pick up a radio signal from the manatee and use signal strength to determine the direction from the boat. The boat is placed in two locations and a reading taken. Where the two lines intersect is where the manatee is during the month.


POWER PLANT
FARM
MARINA
Mighty Mo
Pee Wee
Big Dave
N
W
E
S
SIGNAL STRENGTH
March
MONTH
PLOT

In the winter months the manatees stay around the warm outflow of a power plant and in the summer they are in the sea grass meadows (which the students can visit on an Ecotour). The recommendation at the end of this activity should include some restriction on boat movement in the areas where the manatee is concentrated. All data is recorded in the Field Note Book.

As most schools have only a few computers (perhaps just one) the question comes up "What are the other students in the class doing?" The CD includes a text about Florida's environment and a laboratory manual. There are 22 activities in the manual that extend the on-screen lessons or address concepts not on the CD. One of the activities is named "Where is my textbook?" Students learn to triangulate in order to locate the textbook and other objects before doing Manatee Tracking. Keep in mind, nothing beats a good field trip to a local environmental site to learn this skill.

There are other resources available to the student. At the top of the screen a References bar can be pulled down. One of the references is a group of consultants.



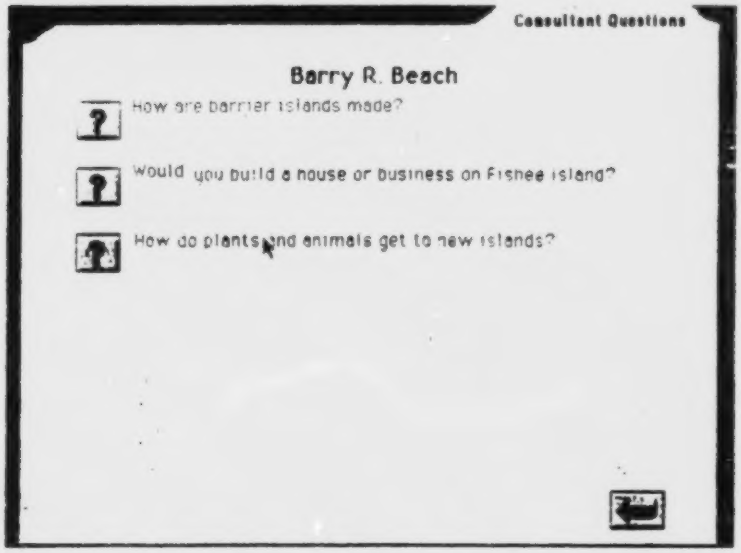
**Barry R. Beach**

Engineer

Office of Beach Management

Department of Environmental Protection

We show men and women from all backgrounds in the program. When one of the consultants is picked, a biosketch of the person can be read or context sensitive questions can be asked. The bio is designed to show that researchers are real people sharing the same range of interests as non-scientists. They do have a life outside of their research. We also give career information here so the kids understand what schooling they will need if they want to do this work. If the Questions box is picked then the questions related to the activity or site are presented. When one is selected a video clip related to the question is played.



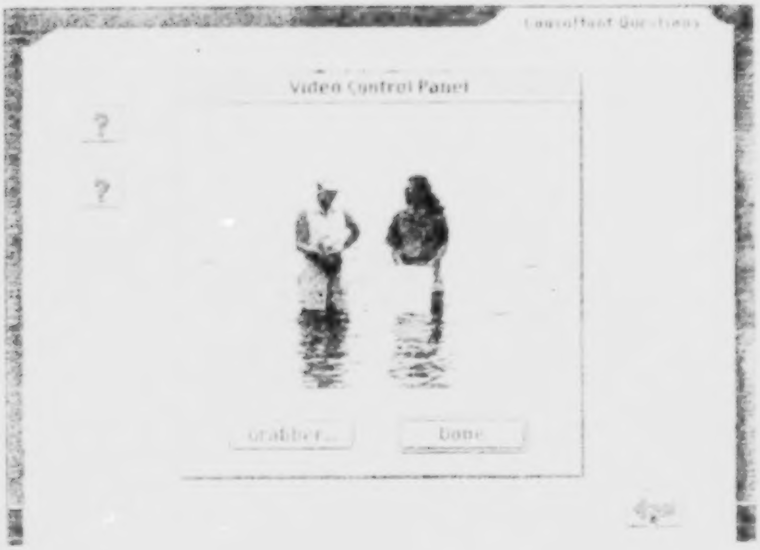
**Barry R. Beach**

How are barrier islands made?

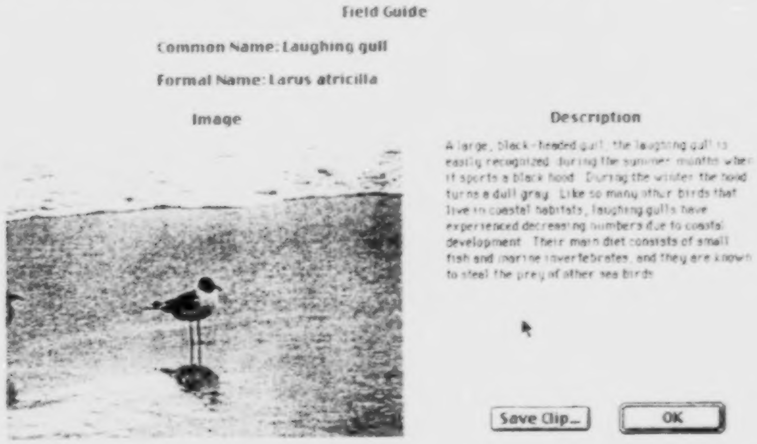
Would you build a house or business on Fishee island?

How do plants and animals get to new islands?

BEST COPY AVAILABLE



Other resources are Field Guides and a Video Encyclopedia.



**Field Guide**

**Common Name: Laughing gull**

**Formal Name: Larus atricilla**

**Description**

A large, black-headed gull, the laughing gull is easily recognized during the summer months when it sports a black hood. During the winter the hood turns a dull gray. Like so many other birds that live in coastal habitats, laughing gulls have experienced decreasing numbers due to coastal development. Their main diet consists of small fish and marine invertebrates, and they are known to steal the prey of other sea birds.

The Field Guides are another way to get to the pictures from the EcoTours, but with even more choices. The Video Encyclopedia is for defining terms rather than showing more organisms.

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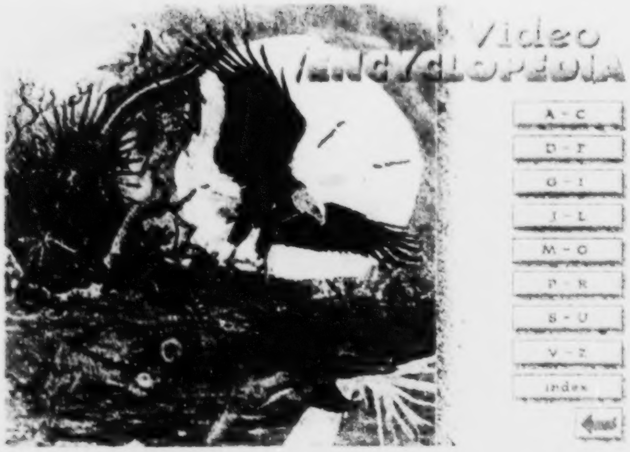

The Tools menu bar, located at the top of every Mac or Windows screen in the program varies from activity to activity. In some places a contour map of the area will be displayed, and at another, a map of endangered specials will be shown.

Context sensitive help is available from the menu bar. Help is also available in other ways. At times a student can click on a telephone icon and get the appropriate consultant on the phone.

There are other resources available on the CD but this overview has touched upon the dominate ones.

**Assessment**

How do we evaluate field trips whether simulated or real? If you are going to have students do problem solving activities using the creativity that they each have, and build upon their interest and then test using an instrument that only requires the regurgitation of facts, you will not have a very successful program. What we have done are turn to some alternatives to the standard evaluation practices. We have not dumped tests, as they are an assessment alternative, but even these tests have changed to become more problem based. A teacher may evaluate what they contributed to the development of the Management Plan for the park. Here are some of the the things we ask our students to do in order to show competence with the content and processes we were stressing.

Some of the alternatives we suggest for students are in the Educator's Guide and include the following: create artwork; make a booklet or brochure about the park; create a concept map; make a database based upon one or more of the EcoVentures; invent a game; make graphs; write a newspaper article about the new park; **create a multimedia presentation;** make a model of the park; develop a photo essay; conduct a survey; teach a lesson; conduct research on some environmental problem. What follows is the detail a student will get if they go to the respective assessment area, in this case Creating a Multimedia Presentation.

> **Creating a Multimedia Presentation**
> Make your own slide show or movie using the computer to "cut and paste" images from the CD. You can also write and insert caption cards into your movie or slide show.
> **Saving Still Images for Your Presentation** 1. Select still images for your presentation from the Field Guides or Video Encyclopedia by going to the image

you want to save. When the image appears on the monitor, a corresponding dialog box appears on the computer screen. Click on Save Clip.
2. Enter a name for the image and click OK.
3. Repeat the first two steps for additional still images you want to include in your presentation. NOTE: You can save images in any order and rearrange them later in the Presentation Builder.
**Saving Video Clips for Your Presentation** 1. Select video clips for your presentation by going to the video clip you want to save. You can save entire clips or parts of a longer "movie."
2. As the video clip is running, click on Grabber, displayed on the computer screen.
3. You will see a horizontal scale with two small, square buttons on either end and a pointed box in the middle. Drag the pointed box to the left of the scale while watching the video. Release the mouse when the video reaches the point that you want to begin your clip. Drag the small square on the left end of the scale until it meets the pointed box. Now, drag the pointed box to the right until you reach the point where you want to end your clip. Drag the small square on the right end of the scale until it meets the pointed box.
4. Click on Preview to see your edited video clip.
5. Click on Save and name your video clip.
6. Repeat steps 1-5 to save additional video clips.

**Building Your Presentation** 1. When you are ready to assemble your still and moving images, select Presentation from the Edit menu. All your saved images appear at the bottom of the screen.
2. Arrange your images in the order you want them to appear in your presentation by dragging each image/clip to a segment of the "filmstrip." Leave a space before or after each image where you want to include a caption.
3. To write a caption for an image/clip, select New Caption from the Presentation menu. Fill in your caption and name it. The caption will appear at the bottom of the screen. Drag it to the filmstrip segment where you want it to appear. You can also edit captions by double-clicking on the caption box and editing the caption.

## Program Evaluation

How successful has the program been? Here are some results that have encouraged us. A number of researchers have found EcoVentures to be successful in teaching the intended content and positive attitudes have been generated. King (1997) found that team work was fostered; EcoVentures encouraged students to explore environmental issues; the interactive aspects of EcoVentures actively engaged students in the learning activities, and students at all ability levels were successful. These results support our notion that heterogenous groups working together on assignments learn from each other and that social benefits accrue to the group and to the class. (De Beer and Dawson)

## Future Activity

We are currently working on a CD for the U.S. Department of the Interior on the Role of Fire in Ecosystems. This is an important issue as we have created some serious problems around the world with our respective fire suppression policies. But this is a story for another day.

## In Closing

Keep in mind that there are people in all cultures, in every corner of this globe, who truly love our natural world. They are fighting hard to preserve what they can in whatever way they have at their disposal. They should be treated as heros and our job as environmental educators is to bring them new recruits. Thank you and have a great conference.

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# A strategy for the implementation of EE in the intermediate and secondary school phases in South Africa.

***GM Bornman (University of South Africa)***

## 1. INTRODUCTION

EE is still not fully institutionalised in formal education in SA. The implementation of Curriculum 2005, which offers opportunities for EE to be integrated in the learning areas, has been delayed. Since 1994 the EECI worked fruitfully towards curriculum development. In primary education where the theme approach had been followed, teachers tried to raise environmental awareness and concern. However, active implementation of EE in the secondary school has not yet begun. Most secondary teachers are not aware of the importance of EE, are not yet trained to incorporate EE principles into the existing programmes and still regard academic aims more important than practical skills. The question arises: What can be done to ensure the successful implementation of EE in schools, apart from the process of curriculum development and the initial education and training of teachers? The continuation of education *about* and *for* the environment - the development of skills, values and attitudes in the intermediate and secondary school phases where little has been done so far - became an urgent matter. The concept of trained EE consultant educators visiting selected schools in an area, guiding and supporting teachers to incorporate EE in there normal programmes, could probably be part of a solution to the problem in South Africa (Schermer et al 1992).

## 2. THE IMPLEMENTATION OF EE IN SOUTH AFRICAN SECONDARY SCHOOLS

### 2.1 General constraints

Successful incorporation of EE into the curriculum and programmes of the intermediate and senior phases seems to be a difficult task. In the literature many constraints such as the disciplinary approach, available time, external examinations, overloading of teachers in the secondary school phases, untrained and therefore incompetent teachers and other external factors, were identified. It also seems to be difficult for students of the age group 12-18 years of age to learn environmental educational skills, values, attitudes and behaviour or to change existing values and attitudes. Margadant (1987), a researcher from the Netherlands believes that a reason for this difficulty could be the fact that secondary school students possess insufficient knowledge of social systems and social skills. Margadant refers to Turiel (1982) who maintained that knowledge could be classified in three domains, i.e. the psychological or personal domain, the social domain and the moral domain. Normally learners in the age group 12-18 years posses knowledge about the personal and moral domains but knowledge about the social domain remains insufficient. Because of their lack of knowledge of the social domain (the social environment could be regarded as a component of the total environment) and their limited life experience, they do not really understand social systems and how to cope with rules and regulations in society. Thus, young people are seldom aware of environmental problems and how these problems are interwoven with social processes and development. They do not realise that every individual should participate and should be involved in the solution of environmental problems or issues in their communities.

### 2.2 Options for the implementation of EE in the secondary school

In South Africa, a few options for the implementing of EE in the intermediate and secondary school phases exist, i.e. the integration into all learning areas and programmes, the attachment of EE content to chosen existing school subjects and the establishment of EE as a separate subject with distinct syllabus. The latter could be regarded as an opportunity to incorporate EE into the broad curriculum as subject of choice for the further education phases (grades 10-12). If EE is only attached to selected subjects or disciplines, such as geography (option 2) and biology, the possibility exists that it could very easily disappear from programmes. Option one, however, offers the opportunity for the integration of EE into all programmes, school policy, management and also into the vision and mission of schools which point to the renewal of many facets of education. The *what* is known but *how* to implement it, still remains a question. Educators need understanding of EE and continuous support in order to take the first steps.

## 3. THE SYSTEM OF EE "CONSULTANTS"

### 3.1 Introduction and definition

Schermer, Frijters and Frings (1992) initiated the project of EE trained educators moving from one school to another within a selected area in the Netherlands, to promote the implementation of EE. During a period of **two years** an educator or a group of subject specialists in specific schools are guided by the "consultant" to implement EE in their **normal programmes**. In the last few months the guidance is restricted in order to monitor the structural continuation of the integration process. Simultaneously, the "consultants" are following a training programme themselves. These programmes consist of feed back sessions, discussion of problem areas and conversations about situations where theory is put into practice. They meet continuously, discussing matters, sharing their experiences in order to improve their efforts.

### 3.2 Premises of the support system

The **premises** of the project are as follows (Schermer et al 1992:8-9):

- EE should be implemented by personal contact and not necessarily through resource material. The teacher, educator, EE centre assistant or EE officer is the key factor. "New practices have to be delivered to schools by sensitive, credible people" (Study of Dissemination Efforts Supporting School Improvements -DESSI 1983).
- The commitment of the teacher is regarded more important than the teaching material. The teacher has to be stimulated and guided to integrate EE in his/her teaching. The consultant supports (assists) the teacher. Teachers have to think environmentally while presenting their lessons.
- Do not try to do too much. Educational change needs time. The integration of EE does not require more time or efforts but a different approach to a subject (theme, etc.).
- Successful implementation requires continuous stimulation and support (institutionalising is a separate phase in the process of change).
- Consultants does not necessarily possess all the skills. Innovative theories have to be studied in order to be applied to different situations. These have to be included in the training course of the consultants.

### 3.3 Strategies of the system

The following are aspects of a **strategy** for the implementation of EE in South African secondary schools:

- Only "credible" people could manage the introduction and expansion of EE in schools
- Teachers need activation and support to integrate EE.
- Consultants should stimulate teachers to discover and expand EE elements in their lessons themselves. They should try to get insight into the flexibility of existing programmes.
- Consultants make appointments with schools and follow them up. They study innovation theories and practices.
- Consultants work actively towards the establishment of EE in school programmes.
- Consultants assist and encourage the teachers, but should not do all the work. Teachers must experience the renewal of lessons as his/her own endeavour.
- Consultants themselves should undergo continuous in service training.
- The implementation of EE should not be finalised in one year. Innovations and change take time (Schermer et al 1992). (Also see Fullan 1982.)

The implementation process could progress as follows:

(a) Consultants visit schools and select a few which will be willing to introduce EE in their programmes
(b) An audit ought to be done in the selected schools to determine the position of EE
© All elements of EE are grouped under the EE umbrella
(d) Discussions with principals and interested teachers should follow the structure of the EE strategy and integration plan within the context and according to the nature (ethos) of the particular school
(e) Consultants take full responsibility for the progress of the integration process.
(f) Consultants together with teachers establish an EE network with other schools

A fixed item on the agenda of the feed-back sessions at the meetings of the consultants should be the discussion of practical experiences. Report writing is an important component of the whole exercise.

### 3.4 Steps of implementation

The different **steps** to be taken (which could also be regarded as a structure for the training programme of the consultants) by the consultants are the following :

1. Arrange the first contact with the school.
2. Make an appointment with the principal and teachers.
3. Arrive at an agreement - the confirmation of appointments with schools and teachers are very important.
4. Plan effective activities for support and implement them.
5. Reflect and evaluate the progress during the first year.
6. Plan activities for the second year. It should be a continuation of the first year programme.
7. Implement activities planned for the second year
8. Arrive at a conclusion of the support programme and transfer the responsibility to the school itself (Schermer et al 1992:15).

The training of the consultants also entails the discussion of relevant implementation theories such as examples of learning cycles; the *Concerns Based Adoption Model* (CBAM of van den Berg & Vandenberghe (1981)- theories of involvement; theories about the development of attitudes, and the art of auditing existing practices. Kurt Lewin, however, believed that nothing is more practical than a good theory. Another aspect which needs attention is the time factor. Initially, a maximum of 40 hours per annum per school could be allocated, distributed throughout the school year from the month of March to October. This assistance should be continued for a period of two years. During the first year the consultants analyse existing programmes, develop the integration process and ascertain the establishment of EE. In the second year they work towards the consolidation of time, energy and financial investment in order to incorporate EE in the selected schools (Schermer et al 1992:15-22).

## 4. POTENTIAL INSTITUTIONALISING FACTORS

Factors which could cause the unsuccessful implementation of EE are the following.

- A loss of funding. " ... the larger the external resource support the less likely the effort will be continued after external funds terminate" (Fullan 1982:76). Teachers must obtain ownership of the process.
- A loss of interest due to many factors such as no award or accreditation.
- The changing of staff. Louis, Berman & McLauglin (in Fullan 1992:77) call it "... the single most powerful internal factor which takes a toll on continued change. They continued: "Since effective change depends on interaction among users, removal of key users weakens the conditions that would incorporate or help new members".
- Rewards and results influence the attitude and commitment of consultants and teachers. In the end renewal of transformation processes should improve both teaching and learning. One has to remember that human beings wish to experience appreciation, acknowledgement and assistance from colleagues. Teachers expect better results from learners (better learning), positive attitudes and more perfection regarding the implementation of the curriculum and the integration of EE into programmes. On the other hand, consultants expect increasing

competences in EE teaching and learning and in the end a certificate as an evidence or reward of their training (their scholarship) and contribution they made.

- Long physical distances between schools in South Africa could influence the cost-effectiveness negatively.
- The multicultural teaching and learning situations. Teaching seems to be difficult when learners from Western, African and Asian backgrounds are grouped together in the same classroom. In teaching and learning EE, life and world views, tradition, customs and religion play a role and should be taken note of. (Schermer et al 1992:125-131)

## 5. EVALUATION AND CONCLUSION

In general, South Africa is in a backward position as far as the education and training of teachers are concerned. In Black schools matriculation results in 1997 were very poor and the whole issue was laid before the door of a learning and teaching culture which did not exist. It seems that teachers need in-service education and training, a sharpening of their teaching skills and a better understanding of the responsibility to prepare children for society, and the outside world and to protect the environment. As far as the teaching of EE and the integration of EE into existing programmes are concerned teachers themselves need to develop a concern for the environment, they need to be equipped with knowledge about the environment (EE), and they have to be continuously supported to do so. The system of competent consultants at schools could contribute to the successful institutionalising of EE in secondary schools.

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# Environmental Education and Education for Survival

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**Global trends and local reality**

Over 25 years ago the United Nations Conference on the Human Environment, in 1972, recommended that "the Secretary-General, the organizations of the United Nations system and the other international agencies concerned, should, after consultation and agreement, take the necessary steps to establish an international programme in environmental education, interdisciplinary in approach, in school and out of school, encompassing all levels of education and directed towards the general public, in particular the ordinary citizen living in rural and urban areas, youth and adult alike, with a view to educating him as to the simple steps he might take, within his means, to manage and control his environment".[1] A few years later, at the Belgrade Conference in 1975, the fundament of environmental education was developed. The goal of environmental education is "To develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones".[2] The objectives of environmental education are:

1. **Awareness;** to help individuals and social groups acquire an awareness and sensitivity to the total environment and its allied problems.

2. **Knowledge;** to help individuals and social groups acquire basic understanding of the total environment, its associated problems and humanity's critically responsible presence and role in it.

3. **Attitude;** to help individuals and social groups acquire social values, strong feelings of concern for the environment and the motivation for actively participating in its protection and improvement.

4. **Skills;** to help individuals and social groups acquire the skills for solving environmental problems.

5. **Participation;** to help individuals and social groups develop a sense of responsibility and urgency regarding environmental problems to ensure appropriate action to solve those problems.

6. **Evaluation ability;** to help individuals and social groups evaluate environmental measures and education programmes in terms of ecological, political, economic, social, aesthetical and educational factors.

The sixth goal was later dropped and the remaining five goals have since 1977 been the pillars of modern environmental education. The holistic approach and innovative methodology and pedagogy put environmental education in the forefront of educational sciences. Later general educational thinking and pedagogy has often copied environmental education's integrated learning, holistic thinking and problem-based techniques. Through the 70's and 80's environmental education grew strong and reached out to millions of educators, curriculum developers and teachers, and ultimately, hundreds of millions of pupils and students at all levels of formal and informal education.

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[1] United Nations Conference on the Human Environment, 1972, Stockholm, Sweden.

[2] Connect, UNESCO-UNEP Environmental Education Newsletter, Vol.I, No.I, January 1976. p.2

The goal of awareness and knowledge about the environment and the problems facing the environment, was met and real awareness about, and concern for, the environment spread throughout many societies. The UNESCO-UNEP alliance in the International Environmental Education Programme (IEEP) became one of the most active and effective networks promoting the use and incorporation of environmental education at all levels of the educational systems around the world. In the same period, many individuals, groups and organizations were also taking action for the environment. The primary focus of most initiatives was not environmental education as such. Where there was environmental education it was in the form of packaged information and measures that were necessary to stop and reverse specific environmental damage. Consequently, such initiatives had only partial effects in attaining the broad objectives of environmental education enumerated above.

The United Nations Conference on Environment and Development (UNCED) held in 1992 in Rio de Janeiro is an important milestone for education in general and for environmental education in particular. Like the United Nations Conference on the Human Environment held in Stockholm twenty years before, UNCED has been the harbinger of new approaches and content to environmental education.

The period between Stockholm and Rio witnessed great strides in environmental education such that it can be said that awareness and knowledge of environment and environmental issues were every woman's and man's property, at least in literate communities. Environmental education was instrumental in bringing about this awareness and rise in knowledge on environmental issues. But had it managed to change people's attitudes, behaviour and participation and had it moved people into taking action for the environment? Had it managed to make people into environmentally responsible citizens? Most educators, environmentalists and policy makers would say "no". It is debatable whether we can draw a causal link between environmental education efforts and increased public participation in environmental governance, inadequate as it is.

The need to increase public knowledge and involvement in environmental management assured environmental education an important status at UNCED. Chapter 36 of Agenda 21, the blueprint from UNCED, has given impetus to more instrumental approaches. Education is no longer seen as an objective in and of itself but as a means to:

- bring about the changes in values, behaviour and lifestyle that are needed to achieve sustainable development, and ultimately democracy, human security and peace

- disseminate the knowledge, know-how and skills that are needed to bring about sustainable production and consumption patterns and to improve the management of natural resources, agriculture, energy and industrial production

- ensure an informed populace that is prepared to support changes towards sustainability emerging from different sectors.[3]

It should be noted that these broad aims are prescribed for education and not environmental education as hitherto defined. This redefinition of education which seeks to incorporate environmental education is the starting-point for post-UNCED new educational "sciences" which try to redefine environmental education or spell out new goals and objectives for a stronger knowledge on and action for, the environment. Some of these "new sciences" have been honest in stating that they are consciously trying to push environmental education further and to reach new horizons beyond the normal purview of the subject. What is important for us as educators is whether any of these approaches is a sufficient departure to constitute a distinct paradigm in the classical sense of that term[4]. The minimum we can say is that the mere existence of these different approaches suggests that there are now evolving disciplines within the generic discipline of environmental education, however one defines it.

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[3] 'Education gets increasing recognition at CSD', in Communicating Conservation, Issue 6, May 1997. p.6

Let us take a look at some of these new branches and off-shoots of the environmental education tree:

**Environmental training** - this approach to environmental education has today been more or less accepted as a methodology of its own. It usually describes environmental education at tertiary or post-tertiary level and it concurs mainly with objective number four of environmental education; i.e. to educate at a sufficiently high technical level to provide its target group with tools to solve and prevent environmental problems. It produces environmental specialists in subjects like engineering, economics and law, as well as environmental managers and environmental scientists. The reason for calling it training instead of education might be linked with that training has a higher status than education and it should therefore be more prestigious to be an environmental trainer rather than an educator.

**Environmental Communication** - is more vague in stating its objectives. A paper on environmental communication claims that "environmental communication is a two-way social interaction process enabling people concerned to understand key environmental factors and their interdependencies and to act upon related problems in a competent way".[5] It is later stated that "environmental communication is closely related to non-formal environmental education".[6] Since a principal function of environmental communication must be to communicate environmental information and messages, it is difficult to draw a line between this and environmental education. Through the choice of wording it may be suggested that **education** is not communicative enough; that would be an important observation. May be environmental education has not been communicative enough and maybe it has only been a one-way dissemination of environmental information? A more charitable interpretation would be that environmental communication is more preoccupied with the techniques and technologies of environmental education.

**Environmental learning** is similar to environmental communication in its choice of wording. Learning connotes a more active process of obtaining knowledge than education, which can be seen as a more passive process of absorbing knowledge being presented to students.

**Education for Sustainable Development** - this discipline is of course the result of the UNCED process in 1992. One of the outcomes of the Rio Conference for UNEP is that its International Environmental Education Programme (IEEP) was advised to redirect environmental education towards Sustainable Development Education. One problem with environmental education before 1992 was that environment had become a very broad subject encompassing many independent sciences, including both natural and social sciences. This had made the subject of **the environment** something very difficult to grasp and educators felt at a loss when faced with such a huge and ill-defined subject. Then the Rio Conference advised that environment should be expanded to sustainable development - an even broader and less defined subject. The definition of sustainable development education thus suffers the imprecision of the parent term - sustainable development. As one writer observes,

*'The principle is an ethical one, the assurance of inter-generational equity, which has to be*

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[4] Classical here is used to mean the path-breaking definition and description of paradigm in Thomas S. Kuhn, **The Structure of Scientific Revolutions.** (The University of Chicago) 1970, second edition, enlarged.

[5] 'Environmental Communication for Sustainable Development', (p.6) a paper prepared under the auspices of the OECD, involving IUCN, GTZ, World Bank, and other partners, 1977.

[6] ibid.

*interpreted globally, not just locally, but it becomes difficult when applied to particular circumstances. It is a successful means of encouraging people to think positively about vital issues, but without access to a good, reliable repertoire of illustrative case histories life for the educator can become difficult, and there is a dearth of suitable material'.*[7]

Finally, **Environmental Citizenship**, or **Global Environmental Citizenship** aims at creating environmentally responsible citizens, through creating awareness and knowledge of the environment and environmental problems leading to environmentally responsible attitudes and actions. These are central themes in environmental citizenship and this discipline therefore uses almost the same goals and objectives as the ones defined for traditional environmental education. There are however subtle differences in emphasis. For example, the global environmental citizenship approach is more informal and mainly targets the out-of-school, using partners to assess the needs of certain groups in society and develop custom-made information strategies with specific environmental citizenship messages. Again it is clear that environmental citizenship overlaps with the philosophy and goals of traditional environmental education.

This brief description of these "new disciplines", linked with a scrutiny of the background, goals and objectives of environmental education makes it fairly clear that these new disciplines are in most instances re-inventing the wheel. The original goal and objectives of environmental education actually encompasses the goals and objectives of these "new" disciplines.

A critical review of environmental education will however bring out many weaknesses in the original discipline which it shares in varying degrees with its new variations. It is clear that environmental education has not fully managed to reach into people's minds and change attitudes and behaviour. It has also been a fairly academic discipline; by academics for academics. Its diffusion and acceptance among target communities, euphemistically called the grassroots, has been rather limited because it has been delivered in the form of useful rather than usable contextual information.[8] It is also clear that the original environmental education paradigm has been unable to be the versatile and innovative education framework it was intended to be. The great strides made in integrating environmental education in the formal school curriculum have not been matched by as much dynamism in the non-formal sectors. The internal reform processes and critical reviews of environmental education have not been very strong or active enough to cope with this challenge. It is only in the last five to six years that we have seen this upsurge of alternative educational approaches giving environmental knowledge to the general public. For the survival of environmental education as a cohesive discipline it is therefore important to study these "new" disciplines as a source of renewal. Environmental educators have to be ready to incorporate these new "anomalies" and new visions to define a multi-faceted paradigm capable of comprehending and meeting the needs of the next millennium.

**'The lesson of the last thirty years is clearly that information ain't necessarily education. Worse, uninterpreted and unrelated to people's everyday lives, it can repel. Which is why we should celebrate the return of experiential learning'.**
**Sara Parkin, writing in** Green Futures, No.6, August/September 1997, p.5

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[7] John C. Smyth, 'Environment and Education: a view of a changing scene', in Environmental Education Research, Vol.I, No.I, 1995. p.10

[8] see Sara Parkin's comments from Green Futures, in the box.

The uneven development of environmental education between the formal and non-formal spheres is paralleled by uneven development of relevant learning materials and approaches between developing and developed countries. Because the impetus for environmental education arose from global conferences and the 'bigger picture', local experiences and needs have lagged behind as reference points for the content and priorities of environmental education. This has led to questioning of the relevance of dominant global models, with calls for home-grown approaches 'believed to be far more appropriate, both to local needs and circumstances as well as in its ability to offer suitable ways of coping with environmental degradation'.[9]

The local and national frameworks are important if environmental education is going to move from a neutral science to guiding action by moulding behaviour for dealing with defined contexts. As an applied science rather than a body of pure knowledge, environmental education must be able to provide guidance in the making of choices. As it has been pointed out, competing priorities and conflicts of interest are inherent parts of environmental decision-making.[10]

> To recognize these conflicts of interest, to understand them and, if possible, become involved must be one of the aims of environmental education. Accordingly, learners should be enabled to take self-determined, responsible action. The existence of participatory structures, therefore, promotes successful environmental education. However, people must also have participatory abilities in the form of communicative and social competence for understanding, weighing up possibilities and negotiating compromises that again have to be promoted within the framework of educational initiatives.
> - German Advisory Council on Global Change (1995) **World in Transition: Ways Towards Global Environmental Solutions** (Springer, Berlin) p.37

What then is the way forward? The list provided below is in no way meant to be exhaustive of changes and recommendations for a more efficient environmental education. It is merely a few suggestions which hopefully will enable educators to focus on some important aspects of environmental education, making it a bit more attractive and relevant, and therefore efficient:

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[9] This is from a discussion document on formal education from the Environmental Education Association of Southern Africa, reproduced in the report on a workshop at the Environment Expo Africa in 1993, Harare, Zimbabwe, by the IUCN Commission on Education and Communication. p.38.

[10] German Advisory Council on Global Change (1995), **World in Transition: Ways Towards Global Environmental Solutions** (Springer, Berlin) p.37

- A less academic approach; environmental education has to come out of the universities and academic institutions, down to a grassroots level establishing a direct contact with its target groups. Environmental education must also adapt to new trends and sub-cultures in society in order to still be attractive for the younger target groups. The issue here is innovation in modes of delivery and in tailoring the content to the needs of end-users;

- Old and new alliances; formal and traditional environmental education must be strengthened, but at the same time it must be complemented by non-formal and non-traditional approaches to reach out to important groups in society. More needs to be done to benefit from indigenous popular knowledge possessed by non-governmental organizations, community-based organizations and other "grassroots" actors and guardians of the environment;

- Integration; many development projects may be failing to have a lasting effect because they lack an educational component. This will be more the case where there are new and unfamiliar technologies and processes. Environmental education, enabling appreciation of potential environmental consequences - whether positive or negative - arms participants with the tools to control for unwelcome environmental effects while enhancing desired ones. Thus public participation in all aspects and levels of project implementation provides cost-effective opportunities for integration of environmental education in daily life;

- Think locally and act locally; environmental education must look at the local environment around its target group in order to effectively reach the audience. Educators must be able to translate broad global imperatives to suit local realities. Global processes like global warming are difficult to comprehend unless related to local knowledge, experiences, and likely consequences for the locality. Local knowledge is no longer enough on its own to deal with aggregate effects at the global level, and yet it is informed local action that can purposefully change the global picture;

- More communication, less one-way education; the most effective way of transmitting knowledge is through dialogue, not monologue. Education must be interactive and multilateral. Let the target group also act as teachers/communicators and let the target group create their own learning material based on their priorities and reality;

- Environmental education must also be free from hierarchy: education must not create a **we-them** situation between the educator and the target group. It must not be "talking down" to people, it should be horizontal communication where educator and target groups are at the same hierarchial level;

- Action oriented activities; environmental education must be action-oriented. Not only as an educational tool, but also as the aim of the education itself. We must move from awareness building towards action and participation in environmental events. We must move towards a feeling of responsibility for the environment;

- Positive outlook and provision of solutions; education which gives limitations without offering alternative solutions, and education which only paints a future dominated by problems, will not survive. Education must give feasible alternative solutions to problems and offer a brighter view of the future. Without it, the target group might lose hope;

- Use of new information technologies; with the rapid development of new information technologies, it must be made sure that these new ways of transmitting environmental knowledge are used to its fullest potential;

- Training of educators and trainers; the suggestions above suggest that environmental education has to be slightly redirected and this message must be conveyed to educators and trainers. They must understand their own role as communicators and educators and they must understand the role of environmental education in society.

Those were some of the recommendations which could be crucial for environmental education in the next few years, if we want to be able to reach out to the citizens of the world and be able to change attitudes and life styles.

But let one thing be clear, changing the name of the discipline will not help, only confuse. A continuous and effective self-evaluation process must be integrated into environmental education and we must be ready to change and adapt to new situations.

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# Major Constraints in the Development of an Instrument to Assess the three Levels of Environmental Literacy of teachers

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## 1. Introduction

Environmental education (EE) is rooted in a philosophy that the quality of life and the quality of the environment are directly related and that each citizen is responsible for maintaining the quality of the environment. It seems there is a need for a citizenry that is competent and willing to take action on critical environmental ' issues (Volk et al. 1984: 10). The causes of environmental problems are many and multifaceted. To take appropriate decisions on vital environmental issues such as toxic wastes, water pollution, greenhouse effect, depletion of the ozone layer, a threat to biodiversity and the like requires an informed citizenry. To produce an environmentally literate citizenry who will take care of the environment is the basic goal of EE (UNESCO, 1980:8). Disinger & Roth (1992:165) noted that Environmental literacy (EL) is a prerequisite to attain environmental quality.

According to Roth (1 992:2) the concept EL is a crucial component of knowledge if citizens are to make sound decisions on the environment. The first step towards teaching children to be aware of their environment is to train their teachers. A widespread view among environmental educators, supports the claim that for the implementation of EE in schools and its quality, the key factor is the teacher, not simply the curriculum materials (Papadiniitdou, 1995:85-86). A number of researchers have expressed the view that teachers are not adequately trained to accomplish the aims and objectives of EE (Childress, 1978. Hurry, 1982:2; Loubser, 1994:36; Pettus, 1982; Pomerantz, 1990-91 Schreuder, 1995:2- Shongwe, 1992: 1). It seems teachers often lack the preparation and confidence to teach EE. Hart (1996:36) noted that what teachers think, what they believe and what they do in classrooms ultimately shape the kind of learning experienced by the children. If teachers do not have the knowledge, skills or commitment, it is unlikely that environmentally literate students will be produced. It is an apparent necessity to prepare prospective teachers to make valuable contributions to creating environmental awareness and responsibility. In many cases it has been difficult to determine how decisions were made about what kind of preparation teachers need to become effective environmental educators. It must be realised that problems of the environment can only be solved if we develop the EL of teachers.

Teachers need to be environmentally literate as teachers are responsible for moulding the students to improve the quality of life and maintain the quality of the environment through daily actions. It must be noted that teachers are not adequately trained to accomplish the aims and objectives of EE. The basic assumption is that the EL of teachers is at a nominal level. Therefore, there is a need to distinguish and assess the levels of EL of teachers. Is it possible to assess a continuum of competencies of knowledge, understanding, skills, actions, and the like? How do we assess these three levels of EL- nominal, functional and operational?

## 2. Environmental Literacy

Developing EL is the primary goal of EE (Roth, 1992; Disinger & Roth, 1992:165) as it deals with solving environmental problems. EL exists at certain points along a continuum ranging from inability (zero competency) to sophisticated memory (advanced skills-very high competency). Thus, it is an oversimplification to assume that an individual is either totally literate or illiterate about environmental issues. That is, there is a broad spectrum of EL, from total ignorance or unawareness to deep, thorough understanding and concern. A person's level of EL should be assessed with the cognitive (knowledge), affective (feeling) and the psychomotor (action) domain in mind (Roth, 1992:15). The levels of EL are generally assumed to exist, but are often not well defined.

For the purposes of this paper, the definition of EL will be adopted as defined by Roth (1992). According to Roth (1 992: 1) EL is the capacity to perceive and interpret the relative health of the environmental systems and take appropriate action to maintain, restore, or improve the health of those systems. EL can be functionally divided into three working levels: nominal, functional and operational.

### 2.1 Nominal Environmental Literacy

It indicates a person able to recognise many of the basic terms used in communicating about the environment and able to provide rough, if unsophisticated, working definitions of their meanings. Persons at the nominal level are developing an awareness and sensitivity towards the environment along with an attitude of respect for natural systems and concern for the nature and magnitude of human impacts on them.

### 2.2 Functional Environmental Literacy

It indicates a person with a broader knowledge and understanding of the nature and interactions between human social systems and other natural systems. They are aware and concerned about the negative interactions between these systems in terms of at least one or more issues and have developed the skills to analyse, synthesise, and evaluate information about them using primary and secondary sources. They evaluate a selected problem on the basis of sound evidence, personal values and ethics. They communicate their findings and feelings to others. On issues of particular concern to them they may evidence a personal investment and motivation to work towards remediation using their knowledge of basic strategies for initiating and implementing social or technological change.

### 2.3 Operational Environmental Literacy

It indicates that a person who has moved beyond functional literacy in both the breadth and depth of understandings and skills who routinely evaluate the impacts and consequences or actions, gathering and synthesising pertinent information, choosing between alternatives and advocating action positions and taking actions that work to sustain or enhance a healthy environment. Such people demonstrate a strong, ongoing sense of investment in and responsibility for preventing or remediating environmental degradation both personally and collectively, and are likely to be acting at several levels from local to global in so doing. They are routinely engaged in dealing with the world at large (Disinger & Roth, 1992:166-167; Roth, 1992:16).

## 3. Major Constraints in the development of an instrument to assess the Levels of *Environmental Literacy of Teachers*

In order to understand the levels of environmental literacy it is necessary to develop an instrument to measure the three levels of EL of teachers. Relatively little work has been done along these lines. In the United States of America (USA), there were some efforts to develop tools to assess EL, but not yet implemented and validated. Wisconsin Department of Public Instruction (USA) have plans to assess EL of students and teachers (Roth, 1992:28). In Indiana (USA), attempts have been made to assess the EL of teachers. It was reported from Indiana (USA) that there were many changes in the level of EL of teachers between 1975 and 1985 (Buethe & Smallwood, 1987). To establish a baseline of EL of teachers, Buethe & Smallwood (1 987) focused their efforts on teachers' familiarity with environmental and related terminology. Buethe & Smallwood (1987) developed an instrument that dealt with three major questions:

- What important environmental vocabulary is known/unknown by teachers?
- How well known are environmental concepts that are directly related to the chosen vocabulary?
- What are teachers' feelings about selected environmental issues?

The study by Buethe & Smallwood (1 987) focused only on limited aspects of nominal EL. Most of the existing instruments address only a narrow aspect of EL such as attitudes or cognitive skills. Most were designed for a one-time, specific use and do not lend themselves to ongoing assessment. It may be because the knowledge, attitudes, awareness, skills, etc. of people towards environmental problems differ.

In designing an instrument to determine the three levels of EL it is essential to understand the levels of EL as provided in paragraph two. The major problem is that there is no clear definition of EL and an environmentally literate person. The term EL does not mean the same to everyone and continues to lack precision. According to Roth (1992: 1) EL is essentially the capacity to perceive and interpret the relative health of the environmental systems and take appropriate action to maintain, restore, or improve the health of those systems. To be environmentally literate, a sound knowledge about the threats to our environment is essential. Stewardship of our environment requires knowledge, attitudes and values which are based on a commitment to shape the world in which we live through thoughtful and active participation. It calls for a perspective which acknowledges that our actions have an effect on the entire ecosystem.

An understanding about an environment ally literate person may provide a clear definition of EL. An environmentally literate person is one who possesses basic skills, understandings, and feelings for the man-environment relationship (Harvey, 1976:76). According to Hurry (1982:44) a person who is environmentally literate:

- is aware of the natural and man-made environment of which he is part of, and..... sees his places of work, residence and recreation as part of the fabric of his own ecosystem.
- He sees himself as a living part of, and interacting with, his ecosystem;
- is aware of the natural resources upon which he is directly or indirectly dependant, and that he has some understanding of finite and renewable resources;
- has a conviction of his individual responsibility for health of the land, where health is the capacity of the land for self-renewal;
- has been committed to caring for his environmental action in his daily life. He is committed to caring for his environment and its resources, in no matter how small a manner;
- is concerned with developing or maintaining a quality of life which is not only acceptable to the majority, but which is also in harmony with the capabilities of the environment.
- perceived risks from contamination and destruction of the environment and natural resource consumption.
- Basic understanding of how the ways in which we organise ourselves as family, community, and national entities, and how the activities we choose to meet human needs and wants affect health, the environment, and quality of life.
- Exploration of how culture, and social and political organizations, and the stages of development of groups of people contribute to these effects.
- Exploration of ethical issues involved in environmental protection and management.
- Exploration of decision making on environmental issues in scientific, economic, legal, social, and political contexts.
- Awareness of how individual decisions affect the health and quality of life of other people and living species, and actions that individuals can take to protect the environment and public health.

The discussion above suggests that an environmentally literate person have a critical awareness of biological, social, economic and political forces in society as these relate to environmental quality and the quality of life. At the same time, there is much disagreement about the depth of understanding of each of the concepts, issues etc.

The second major problem is the development of an instrument to assess the three levels of EL of teachers. A questionnaire designed for the study is an index of what the respondents are willing to admit about their attitudes, knowledge, skills, actions and the like. It must be pointed out that what people say their attitudes are and what their attitudes really are may not be the same. It has been shown by Hines et al. (1 986-87:2) that what people indicate on a questionnaire are often inconsistent with their actual behaviours. Responses to the instrument used may, reflect the individuals perception of how he or she should respond rather than his actual personal commitment. A number of factors over which the researcher has little or no control might have come into play during the administration of the questionnaire. The use of a questionnaire to assess the operational level of EL is questionable.

It may be difficult to separate knowledge, feeling and action. Much of the literature points to the interrelatedness of cognitive, affective and psychomotor domains. On the other hand, it is difficult to assess the sincerity of a verbal commitment. There is no way in a questionnaire of verifying that a verbal commitment is backed by an actual commitment. Actual commitment implies behaviours in which the individual is currently engaged and not in which he says he is currently engaged. Is it possible to assess, for example, the inner feelings of respondents that they may not otherwise divulge

It may be possible to assess whether a person is environmentally literate or illiterate. is it possible to develop an instrument to assess the depth of knowledge and understanding and skills at the three levels of EL of teachers? To what depth of knowledge and understanding and skills? According to (Roth, 1992:15) the levels of EL can be determined by observable behaviours. This may mean that people should be able to demonstrate in an observable form a continuum of competencies of understandings, skills, actions, and the like.

There are methodological difficulties in conducting research in EE. The questionnaire that can be used for this study is very long with so many questions for the respondents to answer. It is very difficult to design a short questionnaire to get maximum cooperation from the respondents. Leaning et al (1993) reported that many researchers used Likert-type questionnaire to assess environmental knowledge, attitude, behaviour, etc. Responses of respondents to a Likert-type questionnaire may be affected by various factors such as school characteristics and the subjects taught. Is it not possible that teachers can exaggerate their behaviours and skills? It is also possible that some teachers do not cooperate with the study as they may see this study as a form of evaluation.

Another problem is the quality and nature of the questionnaire to assess attitude, knowledge or behaviour if the researcher is pressurised by factors such as time and finance. it is also possible that the researcher may bias the respondents to perform in a way consistent with his or her hypothesis of the study. According to Leeming et al (1993:18), it is not always easy to collect follow up data to determine whether the reported behaviours persist over time or not. It will be a major constraint to reach a large sample for the study due factors such as time, finance and location of the schools.

Chacko (1997) developed an instrument to measure the three levels of EL of student teachers with biology majors. At the nominal level the student teachers had to indicate the awareness of important environmental terms. It must be noted that it is possible for a student teacher to indicate that he or she is aware of all the terms. It was found that responses to multiple choice-type questions might have resulted in guessing in some cases. It was also noted that some student teachers obtained better scores at functional level than the nominal level. At the same time, some others obtained better scores at the operational level than at the functional level. This is an indication that this instrument may not be able to discriminate those at the nominal, functional and operational level.

It was noted that the questionnaire would be useful to discriminate student teachers at the three levels of EL and should be followed with interviews with the student teachers in order to gain greater insight, especially in the sections where it is difficult by means of a questionnaire alone to verify the sincerity of verbal commitment to action in favour of the environment. There were no responses to some of the items. The Likert-type responses were restrictive in some cases. It would be useful to have interviews to verify the sincerity of verbal commitment to action in favour of the environment.

## 4. Conclusion

The development and fostering of EL need to be a key objective of any general education program. It is necessary for educators to help students develop an awareness and sensitivity to their environment - to help them to understand how the environment functions, how people interact with it, and how environmental issues and problems arise and can be solved. One of the goals of EE, to produce an environmentally literate citizenry who will take care of the environment, may be achieved by having a team of environmentally literate teachers. The development and use of an instrument to measure the levels of EL of teachers should provide a baseline for curriculum development for continued teacher support in in-service and pre-service teacher training.

There exist major constraints in the development of an instrument to assess the three levels of EL.

These levels are assumed to exist, but are often not well defined. There are several methodological issues in the development and use of the instrument to assess the three levels of EL of teachers. It should be possible to develop instruments that more effectively and accurately assess achievement of various levels of EL, as the term EL is better clarified and level of EL is established in educational programs.

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## Exploring common grounds for environmental education in the US and Pakistan to make recommendations for negotiating barriers in pakistan: a comparative study

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### Purpose of the study

The purpose of this study was to compare the development of the environmental education movements in the U.S. and Pakistan. The histories, barriers and gateways to the movement's development in the two countries was studied and common grounds explored. Based on the findings, recommendations for adapting the learning from the U.S. experience, where appropriate, has been made for environmental education movement in Pakistan.

### Objectives of the study

The specific objectives of the study are to:

1) Describe the development of the environmental education movement in Pakistan during the period 1985 - 1995 and examine the process, action taken, actors and barriers as perceived by the decision makers today;
2) Describe the development of the environmental education movement in the U.S. during the period 1970 - 1980 and focus on the process, action taken, actors and barriers that existed and the ways they were negotiated;
3) Determine common grounds for environmental education through learning from experiences in the two countries focusing on four themes namely, attitudes of decision makers, public perceptions, monetary considerations and development of educational activities and
4) Make recommendations for the evolution of the environmental education movement in Pakistan based on objectives 1, 2 and 3.

### Limitations of the study

Time and monetary constraints limit this study to a purposefully selected sample of population in Pakistan and the U.S. The target population, however, has been involved in education or development activities and all subjects have achieved a graduate or post graduate degree.

The outcomes are recommendations that are limited to possibilities of in-country environmental education programs in Pakistan or elsewhere, following a similar development continuum as in the U.S. Other factors such as culture, society and economics need to be examined further for developing a comprehensive country program to succeed.

### Basic Assumptions

Assumptions used in the development of this study are:

- The participants in the study understand the concepts behind environmental education and have directly or indirectly experienced it.
- The respondents will answer the questions honestly and to the best of their ability with respect to instructions, their concern for environmental issues, and their attitudes towards the environment.
- The concerns and ultimate goals of environmental education (for example, change in behavior and increased awareness about environmental issues) are the same in Pakistan and the United States.
- Human dynamics have the same values and people react to their beliefs in the same way in the two countries.

- The attitudes, perceptions and belief systems of the decision makers as well as the development of environmental education is following the same curve in all provinces of Pakistan.

**Research design**

This is a descriptive study to explore common grounds in the development of environmental education movement in Pakistan and the U.S. The study has assessed the perceptions of decision makers in the two countries. Four different paradigms were explored, namely attitudes of decision makers, public perceptions, monetary considerations and development of educational activities. As data have been collected in two different locations for this purpose, separate procedures were adopted using the technique of methodological triangulation which is "employing multiple methods to study a single problem or program" (Denzin, 1978). These included qualitative as well as quantitative methods

The subjects for this study are environmental opinion leaders having experience of educational, environmental or developmental activities in either of the two countries. These have been identified by the researcher and constitute a non-probability and purposive sample.

As two different methods were used for collection of data, the procedures for analyses were also different. Quantitative data from Pakistan was analyzed using descriptive statistics and the statistical package of SPSS (version 6.1) and results interpreted from the outcomes. Qualitative data from the U.S. were examined by analyzing the responses to questions asked in the interviews and field notes 'Scissor and sort' method of qualitative analysis was used for this purpose (Miles and Huberman, 1984).

**Major milestones in the environmental education movement**

| Action | United States (1970 -1980) | Pakistan (1985 - 1995) |
|---|---|---|
| Legislative | National Environmental Policy Act of 1970.<br>Environmental Protection Agencies established in early 70s. | Environmental Protection Ordinance of 1984.<br>Environmental Protection Agencies established in late 80s |
| Administrative & Financial | Federal government through approval of National Environmental Education Act of 1970 and 1990<br>Education foundations established by businesses, industry and corporations(e.g. Kellogg , Ford and Carnegie)<br>NGOs active (e.g. NWF, WWF and Sierra Club) | Federal government through approval of the National Conservation Strategy in 1992<br>Education foundations established by business, industry and corporations (e.g. Pepsi, Adamjee and Aga Khan). NGOS active (e.g. IUCN, WWF and Teachers' Resource Center) |
| Implementation | Activities such as establishment of Clearinghouses and networks for teachers promoted by the National Environmental Education Act<br>Projects continuously developed, implemented and evaluated. Projects Learning Tree, Wild and Wetland, for example | Activities planned through national and provincial conservation strategies.<br>Promotion of activities like Establishment of nature clubs, In-service teacher training and Adult literacy Scheme.<br>A five-year (1986-1991) Cooperative Environmental Education Program by Federal Ministry of Education. |
| Academic | Informally integrated into all levels of education i.e. school, colleges and university.<br>Comprehensive teacher support systems available | Being informally integrated into the school system.<br>Post graduate certificates and diplomas available since late 80s<br>Some teacher support available. |

**Discussion**

Examining the attitudes and perceptions of decision makers and general public during the periods under study in both countries, it appears that educators have a better understanding of the concepts behind environmental issues than policy makers. The environmental opinion leaders in both countries felt that it was possible for environmental education to support and strengthen the teaching of social and natural science subjects in formal education. On the other hand, the policy makers in Pakistan as well as the U.S. have not been very enthusiastic about 'officializing' environmental education; this attitude changed later in the U.S. Formal channel of education has been considered suitable for implementation of environmental education in both countries. Integration of environmental education in social and natural subjects of school curricula has so far been the most effective strategy. Designation of state coordinators and support systems for teachers helped promote environmental education in the U.S. Role of NGOs has been very important and catalytic in creating an awareness towards environmental issues in both countries. These organizations are considered to be capable of providing the key spark to mobilize action. Media has also played a prominent role in focusing public's attention on environmental concerns in both countries.

As far as the role of government agencies is concerned, the political climate has influenced education policies in both countries. The federal government of the U.S. supported the environmental education movement through the National Environmental Education Act of 1970 and later re-emphasized it by National Environmental Education Act of 1990. In Pakistan, the government is planning implementation of the National Conservation Strategy where environmental education appears as a supporting program. The government also has the Environmental Protection Ordinance of 1984 in place. This ordinance has established a Council for Environmental Quality and Environmental Protection Agencies in all provinces of the country. However, no specific legislative support has been provided so far to environmental education.

## Status of environmental education in Pakistan

A number of people feel that environmental education has been progressing in the country during the last decade (1985 - 1995) although the pace has been slow. To introduce environmental education to the younger generation, all three channels i.e. formal, non formal and informal, are considered suitable. Government schools have the maximum outreach but are not equipped to deliver environmental education goals. Private and semi private schools catering to a specific sector of society are at present involved in environmental education activities in the formal school system and are faring well. Media, print as well as electronic, have been involved in creating environmental awareness in general public. Although NGOs currently have many projects for environmental education, strong suggestion of environmental opinion leaders of this study is towards NGOs future involvement in developing resource material and information networks. The general opinion of the respondents is that government is presently not playing an important role in environmental education activities. The government officials need to be more involved especially in providing in service training to teachers, and administrative and financial support to educational institutions that focus on environmental education. Private sector is not considered active in supporting environmental education activities. Some feel that the private sector needs to be minimally involved in providing administrative and financial support but remain active in the development of human resources and educational resource material.

As far as monetary implications are concerned, the government of Pakistan is not considered supportive but definitely needs to be. In the opinion of this researcher, NGOs are doing their best in the field but they need to reduce this and use their resources in other activities. The same opinion is held of the private sector.

The formal channel of education and school teachers appear to be most effective in implementing environmental education activities. Extracurricular activities of communities and youth have a far reaching impact and can be even more effective if financial and administrative support is provided to them. Print and electronic media can also be used in creating and developing environmental awareness in the citizen. To some extent, the media is already achieving this.

Another important sector in Pakistan is considered to be workplace education for working children. It is not currently very effective, but if supported, can reach out to a large number of children. Work place education for adults can also have a stronger impact if it works through environmental education and is given due support for this purpose.

## Status of environmental education in the U.S.

The decision makers in the USA have clearly identified two major events that marked the beginning of environmental education era. These are arrival of *National Environmental Education Act* of 1970 and *Journal of Environmental Education* in 1969. Public support was characterized by a celebration of the first earth day on April 22, 1970. These activities were prompted by the aftermath of some environmental disasters in the country. These environmental disasters pulled people together and environmental journalism emerged to provide a voice to concerns of the people. Media successfully communicated these concerns to the policy makers which resulted in timely action by the government.

Academia led the progress of the environmental education movement through activities such as development of human resources, resource material, and information networks. NGOs followed by complementing the formal education system through non formal actives for environmental education in their states. Strong support systems for school teachers ensured a continuous supply of information to them. State agencies and NGOs worked together to develop useful resource material and in service training programs for teachers; also to provide any back-up system teachers might require. Teachers and other educators were self selected and motivated enough to cater for environmental education using their personal resources such as time and money. National networks like the Conservation Education Association and National Association for Environmental Education assisted the educators, they later joined hands and became the North American Association for Environmental Education providing a platform to environmental education activities. Federal and state agencies, NGOs, academia, and committed individuals strengthened the implementation of these activities in the country.

**Recommendations for Pakistan**

Analysis of findings in this research study shows that environmental education movement has been progressing steadily in the U.S. and Pakistan. It has been through some turmoil but has finally established itself as a defined sector of education that needs further support. The environmental education movement has seen many strategies but what has evolved is very interesting. In Charles Roth's (1995) words, "Environmental education will not succeed until it completely disappears, in other words, is fully integrated at all levels of education".

To avoid the pitfalls encountered in the U.S., Pakistan needs to have a central coordinating body for continuous assessment of progress. Ad hoc activities for environmental education should be discouraged and the coordinating body should safeguard this. Standardized processes need to be developed for identifying suitable projects and just appropriation of funds.

There are a number of steps that Pakistan can take in order to ensure evolution of environmental education and its complete integration at all levels.

1. Environmental matters are directly related to the daily realities of life. The development of environmental literacy therefore becomes the first and foremost step to be taken. This will lead to creating as well as raising environmental awareness in the citizens of Pakistan.

   The findings of this study have shown that to be environmentally literate, the formal literacy skills such as the ability to read and write are not a pre-requisite. The low literacy levels therefore will not be a major concern for designing programs for this purpose. Environmental literacy can also be created through infusing EE in other existing programs such as health education, drug education and extension activities. This integration would be very valuable in less privileged urban and rural areas of the country. Environmental education should be leading towards this literacy by designing processes to provide necessary decision making skills to people.

2. Research activities such as need assessments and academic research for monitoring and evaluation of current activities in order to develop future programs need to be promoted.

   Research activities such as needs assessment and academic research are necessary and form the basis for developing suitable methodologies for environmental education programs. Support of academia needs to be acquired for this. The important factor to remember here is that the outcomes of all research activities must match the needs of the implementer - the teacher of formal, non formal and informal education sectors. In the U.S., research in EE has been conducted, recorded and made available to any one who desired to base their programs on the outcomes. Special clearinghouses for disseminating this information were established and have proved successful. There is a need for similar research activities and this need has also been expressed by the environmental opinion leaders who participated in this study.

3. Development of networks and databases of environmental professionals for sharing experiences and for exchange of information regarding endeavors in the field of environmental education.

   It has been established in this study that sharing experiences leads to learning from each others' failures and successes. This also helps safeguard against re-inventing the wheel. Development of information networks, electronic as well as print, focusing on environmental education activities would help assess the adaptability and implementation of different ventures in EE for specific needs and situations. Regular publications of research activities and report of case studies from home and abroad could help in identifying and utilizing the already existing expertise of environmental educators active in the region.

4. Environmental education should be given strong legislative and financial support by the government in order to establish the movement more firmly in the realms of education.

Environmental education appears to be a supporting program in the implementation of the National Conservation Strategy. To provide the movement an 'official' status, it needs to be legitimized through special focus laws. These could be enforced through provincial ministries of education and environmental protection agencies. Coordinators designated in every district or province for environmental education and active through either of these agencies could ensure the implementation process. Special funds appropriated for environmental education would secure and strengthen the future of innovative environmental education activities in the country.

5. To achieve goals of environmental education, primarily change in behavior and problem solving skills in learners, a nucleus of human resources need to be developed.

There is a dearth of environmental educators and other environmental professionals in the country. National, provincial and local training programs need to be evolved. A cadre of professional thus developed could have a multiplier effect and more subgroups of professionals capable of providing the required training would evolve. Corporate Pakistan could assist by providing financial and administrative support in organizing activities for this purpose.

6. Educational activities in the formal education sector need to be coordinated and promoted by the educational NGOs by assessing the models demonstrated by private schools and adapting these for government school system.

Predominantly focusing on the younger generation, it is possible for the formal education sector to impress the young minds with importance of environmental responsibilities. Environmental education can also help expand the critical knowledge mass among adults through higher education and adult education programs and impact on long term learning, ultimately leading to an improved quality of life. This study has shown that compared to policy makers, educators are more aware of environmental issues. The educators therefore need to be involved in all decision making processes along with the bureaucracy.

The private sector of education is also a promising channel that could play a model role in developing experiential education for the environment. A range of efforts, however limited to the private sector of the society, already exist and with the necessary modifications, can provide a tested model for introducing environmental education in the government school system. These could also be replicated on a larger scale in many parts of the country.

7. Role of academia needs to be prominent in developing resource material for environmental education at all levels.

To integrate environmental education in the existing curricula of the formal sector, a number of strategies need to be developed. A successful strategy in the U.S. has been the involvement of academia from the faculty of universities and colleges to support the school teachers. The methodology used was development of resource material and providing related training to teachers. After careful evaluation and redesigning of the resource material produced, teachers were given in service training and certification to use the material. Regional coordinators, teacher networks and other support systems such as ERIC clearing houses provide an ongoing support. Project Learning Tree focusing on forestry, Project WET for water related issues and Project WILD for environmental education activities are further examples of this.

8 Since the education system in Pakistan does not cater to all children, other channels of non formal and informal education need to be explored and utilized for reaching out to those children who do not go through the formal education institutions.

The local communities that encompass youth and adult groups, female sector, working children and other skilled and non skilled workers can address their environmental concerns through domestic and regional activities. For the working children, workplace related educational activities could move them towards an awareness of environmental issues around them. Indeed, some efforts by private and non profit NGOs in this direction have proved effective and could be duplicated on a larger scale. Extracurricular activities and celebration of special events like Earth Day and World Environment Day by youth groups and communities involve a number of people as 'whole family' groups and seem to be effective. This informal activity can impact on the daily decisions of citizens and needs to be drawn upon as a resourceful channel.

9 The role NGOs have played in the past in the field of environmental education is very distinct and their experience is substantial. This valuable 'track record' could be used in designing and implementing further strategies for environmental education.

The non-governmental development organizations have been the key spark for development of environmental education and they will have to remain so, for indirectly leading the government agencies into accepting their proper role in supporting and institutionalizing basic environmental education. They will also have to take the lead in developing and implementing environmental education in the non formal sector of the education system. For this purpose, the NGOs may also need to provide the missing link between the corporate sector and the education system in the country. This sector could be approached for financial support to environmental education activities.

10 The private institutions, corporate sector, business and industry need to support educational activities for environment and its related issues by providing financial and administrative support to those who require it.

A few foundations and corporations have supported educational activities in the country in the past. Environmental education is however not on their agenda. This policy needs to change and EE prioritized when funds are being appropriated for educational activities. This sector could also assist in establishing networks and coordinating national activities such as national and international conferences , short and long term in-country training programs, and exchange of regional experiences. Business and industry also need to support activities like establishment of nature clubs and nature centers where needed for educating the public.

11 Electronic and print media reach out to a large number of people through channels such as newspapers, radio, and television. This can provide a very effective tool in creating and raising environmental awareness.

The role of media in creating awareness in the general public, the daily decision makers needs to be catalytic. Electronic and print media have proved effective in the past and need more vigorous support by the citizens as well as the policy makers. While television reaches out to a large number of people in urban and peri-urban areas, radio and newspaper cater to a larger number including those in the rural areas. Print media, especially in national language, can successfully help focus public's attention on the country's environmental concerns and its related issues such as population and poverty alleviation. Environmental journalism needs to be further promoted for this purpose. There is also a need to develop a resource base for disseminating information to environmental journalists.

12 The government of Pakistan through federal EPA and ministry of education needs to be the

chief coordinator for bringing all the stakeholders mentioned above together. It is recommended that a task force with representatives from all sectors be established for the purpose of developing a negotiated strategy for environmental education in Pakistan.

Last but definitely not the least is the role of government agencies and the task force established. Members of this task force will need to jointly develop environmental education programs and identify implementation processes. They could also act as the coordinating body for monitoring continuous assessment of progress of the environmental education movement.

In the words of American environmental educators, Harblin and Mannered (1976),

"The very existence of an environmental movement implies a hope
that needs to be transformed into positive images of the future towards
which momentum can be developed. Environmental education programs
have a role in both the creation and fulfillment of such images".

This is true for Pakistan as well.

**Need for further study**

This study constitutes basic and exploratory research for environmental education in Pakistan. To further the search for answers to many questions that arise, there is a need to assess the impact of other factors such as culture, religion, society and economics on the progress of environmental education.

Results of this study can only be generalized to that sector of society which has characteristics similar to the respondents of this study. These do constitute a part of the policy makers and decision takers of Pakistan. The study's limitations however do not make it generalizable to the whole population.

Time and monetary constraints limited this study to a selected number of subjects in both countries. Selection of a non purposive and random sample of a more diverse population may provide a more clear picture.

This study can be replicated not only in Pakistan but also in other parts of the developing world to find common and strategical solutions for addressing environmental concerns through education.

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## Name of project: E.A.S.Y programme (Environmental Award System for Youth)

***Mrs Dee De Bruin***
***Barry Barnes***
***Cherie Barrowman***
***Radika Gajathar***

### HISTORY AND BACKGROUND

Due to a lack of educational material available for teachers on environmental, water, waste and population issues, the Education sub committee of the Keep Pietermaritzburg Clean Association (KPCA), decided to develop a strategy in order to ensure awareness and active participation of the youth in environmental and population education The committee aimed at developing a sustainable and holistic education package/module that would support teachers in teaching environmental and population issues, and that would encourage ongoing participation by the students

Committee members comprise representatives from KPCA, Natal Parks Board, Wildlife and Environmental Society, Population Development, Municipal Health Division; KEN Health Department & Dental Section: SPCA; Tatham Art Gallery ' Umgeni Water St

Nicholas Diocesan, Herb Society; Suncrush Ltd

The current Chairperson of the KPCA Education Sub Committee is the representative from the Natal Parks Board, Mr Barrie Barnes All the committee members played a major role in developing the programme and the teachers' manual The chapters in the manual and the responsible organisations are

| CHAPTER | | RESPONSIBLE ORGANISATION |
|---|---|---|
| Waste Management | - | Keep Pietermaritzburg Clean Association |
| Conservation | - | Natal Parks Board |
| | - | Herb Society |
| | - | Wildlife & Environmental Society |
| Population | - | Dept of Population Development |
| Health | - | City Council Health Division |
| | - | KEN Health Dental Sections |
| Community Development | | |
| - Animal Awareness | - | Pietermaritzburg SPCA |
| - Pet Care | - | Veterinary Association |
| - Arts & Crafts | - | Tatham Art Gallery PmbBURG TLC |
| - First Aid | - | Compiled by SA Noodhuipliga - now to by St John's Ambulance |
| - School Liaison and advice | - | St Nicholas Diocesan School |

### E.A.S.Y PROGRAMME OBJECTIVES

The region objectives of the E A S Y Programme

- To develop a better understanding of the relationships among demographic dynamics, technology, cultural behaviour, natural resources and life sup systems

- To create a non-discriminatory resource that will benefit all community regardless of that group's economic status
- To emphasise the needs for linking population and environmental activities
- to ensure youth and community participation projects both rural and urban
- to establish a forum to serve community interests around environment compatibility
- to adhere to the actions set by :

1. World Population Plan of Action (WPPA) 1974
2. International Forum on population 1989
3. UNFPA - United Nations Fund for Population Activities, Cairo 1994
4. UNCED Conference - United Nations Conference on Environment and Development, 1992
5. The Constitution of the Republic of South Africa, 1993 (Act No 200 of 1993) *viz "a local government shall render services within a safe and* healthy environment"and *"every citizen shall have the right to an environment which is not detrimental to his/her health or wellbeing"*

The White Paper of the Department of Education that was published in 1994 listed environmental and population education as crucial education activities to contribute to the knowledge and understanding of students about environmental and population issues.

The E.A.S.Y programme will contribute to the overall quality of education in South Africa, by means of its focus on active participation and involvement by educationists and learners. Traditional education methodologies will also be strengthened by the use of mixed media.

## NATURE AND IMPLEMENTATION OF PROJECT

The project will be divided into three modules and the following media mix will be utilised:

a) **E.A.S.Y module..** Is aimed at primary school level and consists of information in package form for ease of reference for teachers on various topics, linked with a wide choice of activities to ensure learning by participation of scholars. Activities (chosen at random by the school) will be evaluated on a point scoring system (similar to NOSA ratings). The status of the school's involvement and their achievements, based on the scores, will be displayed on a board to be erected outside the school. Private sector involvement is evident here, with the provision of signboards and printing of manuals sponsored by business and industry. The aim of a signboard is to encourage competitiveness and awareness amongst neighbouring schools and residents. The allocation of points are non discriminatory and schools with or without resources are able to participate. This module relates well to outcomes based education practices and has been welcomed by the Department of Education.

b) **Radio Maritzburg** : A radio programme discussing all the issues raised in the manual is broadcast weekly. Topics of discussion are linked with the schools' modules mentioned above and include participating schools or guest speakers in panel discussions, debates, phone-ins etc. The programmes are aimed at the youth and are in English and/or Zulu. The duration of the programme is one hour, on a Friday evening from 6pm - 7pm. During this time frame, sponsors or any other assisting organisation, at the discretion of the Chairman of the Education Sub committee, are offered an advert free of charge.

c) **Newsletter** .. A newsletter is distributed quarterly to ±l 00 schools in the Radio Maritzburg radius area. It focuses on senior primary students, 10-13 years of age and consists of information, games, activities, competitions and updated information for schools participating in the star rating system. Commemorative Theme days/weeks are also focused on in this newsletter, eg Water Week, Environment Week, Arbor Day etc.

## TARGET AUDIENCE/RECIPIENT COMMUNITY

The present EASY Programme has been aimed at the youth (scholars and non scholars). In return for the use of this package, the edition for secondary school level is being developed for KPCA by the South African College for Teachers Education, leaving the KPCA Sub committee free to embark on the development of a programme for communities and business and industry, during 1998.

What is meant by the community as a target ? Targeting communities means aiming this education at all groups. Schools, city, urban, peri urban and rural groups; business and industry, the unemployed, are all targeted as a community. Reaching business people through a business and industry programme, also means reaching the families of those business people, and teaching business people the value of environmental education for all. Learning the value of this education should encourage greater participation by this community. This is the aim of the Keep Pietermaritzburg Clean Association 's education sub committee during 1998.

## CONCLUSION

The EASY programme is an educational response to various aspects of demographic, social, cultural and environmental problems. It will help learners to understand interrelationships between population dynamics, environment and sustainable development with the purpose of promoting rational attitudes and behaviours for improving the quality of life of the learners, their families and communities. The EASY Programme also caters for the outcomes based education process by providing guidance and advice for hands on activities, in relation to the eight learning areas of the new curriculum.

## CURRENT STATUS OF PROGRAMME

The EASY Programme was launched on November 15, 1996 at a civic function at the Pietermaritzburg City Hall and has been running for the duration of 1997.

An excellent response has been received and 36 schools are currently registered on this programme. A 70cm floating trophy has been donated by Hulett Aluminium for presentation to the school that has earned the most points at the end of each school year.

Due to the new education policy and curriculum in schools, whereby life skills and outcomes based education is the way forward, this programme has received great accolades by both teachers and the Education Department. Teachers have welcomed this programme because during the forthcoming year resources will be deficient and this programme will provide teachers with the aids and information required in many cross curricula subjects.

The EASY Programme has since been presented at the 1997 EEASA Conference in Pretoria and as a result of which, was presented to four cities in Gauteng, hosted by the South African Teachers College for Education and Annegarn Air Research Organisation. Implementation in Gauteng is currently being investigated.

The potential of the programme has only been realised during its first year of implementation in schools and through reaction to the abovementioned presentations. This potential makes the programme useable not only in schools, but with communities and business and industry. The layout and simple text can be used to promote environmental education through literacy classes. It provides basic environmental education at grass roots level, in a simple and acceptable method, unlike the current available methods through academic text books, totally unsuited to disadvantaged communities, so desperate to learn and develop.

The Keep Pietermaritzburg Clean Association aims to provide education in our province with a sustainable, holistic education programme that will engender in all some of the vital components of a) our constitution, and b) the National Environmental Policy that aims to "... *review needs, determine deficiencies and to develop and implement an environmental education and training programme in consultation with the Department of Education, covering format, non-formal and interdisciplinary are*

It is without doubt that the Environmental Award System for Youth, will contribute to t process.

### EDUCATION SUBCOMMITTEE OF KEEP PIETERMARITZBURG CLEAN

Keep Pietermaritzburg Clean
Natal Parks Board
Umgeni Water
Pmb. TLC City Health Division
St Nicholas Diocesan College
Suncrush Ltd
Herb Society
SPCA
Tatham Art Gallery
KZNPA Dental Health
Wildlife and Environmental Society

# UNIVERSITY ENVIRONMENTAL POLICY: an overview of the environmental education teaching, researching and extension programs and administrative activities at the Federal University of São Carlos (São Paulo State, Brazil).

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## Abstract

Too many ways have been followed to achieve the desired environmental values, habits and attitudes from the internal and external communities of UFSCar. Initiatives in the academic aspects, which involve graduation and pos-graduation subjects, research and extension projects on environmental education and related issues. By the other hand, to deal with the administrative aspects, it was created a specific department to develop and implement institutional environmental policy. UFSCar campus was an old farm with 650 hectares, divided into a rural and an urbanised area, each one with its typical problems. The population campus is around 10.000 people so there are many conflictive uses and expectatives that must be dealed in a environmental perspective. Many programs have been carried on by the Special Environment Commission. The results of our actions are not so easy to measure, but examples can be done on internalisation of the environmental issue into the administrative and academic spheres.

## Introduction

In the current days, the notion that the environmental degradation does not respect physical, geographical, cultural and ideological borders, reaching all the human beings, although in varied degrees, becomes more and more spread. The systematic destruction of the rural and urban landscapes, besides committing the common patrimony for the future generations, contributes for the deterioration of the quality of life of the current societies, demanding efforts to turn them conscious of their history and more active in the preservation of their environment.

## Historical aspects

Analysing the environmental subject in Brazil, it is verified that the process of degradation of the nature had beginning soon after the arrival of the Europeans, with the intensive exploration of the brazilwood, tree symbol of the country and that was distributed by the whole strip of the Brazilian coast. Starting from there, other noble wood became object of a predatory process of economic exploration. The effective occupation of colonial Brazil starting from other agricultural or extractives activities with high impacts on the natural resources. In the specific case of the São Paulo state, it first stands out the monoculture of sugarcane, destined to the production of sugar, implanted in the north strip of its coast and extending soon after in direction to the state of Rio de Janeiro and for the interior of the country.

In the centuries XIX and XX, the coffee cultures had substituted the cultivation of the cane, and they would be the great responsible for the deforestation, destruction of the fauna and degradation of the soil. As the culture of coffee went moving to the west of the state, the areas in decadence, with soils already out, they went being substituted by pastures for extensive cattle creation.

There are about 20 years, to overcome the crisis generated by the high cost of the petroleum in the international market, Brazil adopted the ethyl alcohol, obtained starting from the fermentation of the cane broth, as alternative fuel to the gasoline. The monoculture of the sugarcane returned then to move forward quickly, carting a series of negative consequences, altering the rural scenery of the state completely, not only in relation to the physical, chemical and biological aspects of the environment, but also to the economic and social aspects. Other monocultures for export, as orange trees and of the soybean contribute to this situation.

The state of São Paulo presents different environmental problems, being, between the Brazilian states, what presents the largest population density and the largest industrial park. Since the beginning of its occupation it went losing its natural vegetation areas of which remain today less than 5%. The deforested areas, besides they represent important loss of the biodiversity of the several destroyed ecosystems, they are busy for destructive activities to the environment and the own man. The inadequate handling of the soil and the processes used in the agriculture provoke fertility decrease and soil loss by erosive processes that will determine the silting of the water courses. The indiscriminate and incorrect use of pesticides provokes ecological unbalances at the level of the alimentary chains, besides contaminating superficial and underground water bodies.

The intense urbanisation brought countless environmental problems, presents in the great majority of the cities, and strongly worsened in the great urban conglomerate. Among them, the deficiency in basic sanitation, the lack of effective habitation politics, the lack of planning for use and occupation of the soil, besides the problems with collection, treatment and final disposition of urban residues (domestic and industrial), generating pollution and contamination of the air, of the water and of the soil.

It is the historical-environmental context of São Carlos city where the Federal University of São Carlos is placed (UFSCar). With a population about of 180.000 inhabitants, the city is characterised by an economy based on agricultural, cattle and industrial activities. The presence of two public universities of quality (UFSCar and a campus of the University of São Paulo) favoured the development of a pole of companies of high technology, beside the traditional industries and of the activities of instalment of services.

It stands out the important reserved paper to the universities, as generating sources of knowledge, through the scientific research, of the recovery and diffusion of information and, mainly, of the formation of human resources. In environmental terms, it fits to them the paper of promoting changes in the relationship man-nature, in way to contemplate procedures and compatible technologies with the sustainable development of the involved communities.

## Academic development in environment

They were delineated in UFSCar several complementary proposals of environmental approach. One of them, is characterised by the search of the adaptation of its curricula, with attempts, still isolated, of incorporation of aspects multi and interdisciplinary related with the environmental subjects, so that the formed professionals are conscious of its responsibilities and possibilities of performance and committed with the necessary changes. GAUDIANO (1997) makes severe critics to the introduction of the environmental thematic in the Mexican universities, that is somewhat similar in our institution. According to him, the initiatives were not deepened to the point of to allow a true change in the educational process and in the traditional structure of the university courses, because the Environmental Education, in that context, turns into a new dimension of doing educational, with wide possibilities, so much for its interdisciplinary and criticism potential, as for its contributions to the pedagogic conception in itself. At the Norwegian universities the future teachers are receiving practical-pedagogical training to deal with the environmental elements at basic schools (ROYAL ..., 1997)

UFSCar, from its creation in 1970, possesses a course of Graduation in Biological Sciences, with strong emphasis in Ecology. In 1976 appeared the course of Masters degree in Ecology and Natural Resources, one of the first of Brazil, with the objective of forming researchers in master and doctorate level in the field of the Environmental Sciences.

In 1993, it was introduced in the graduation course in Biological Sciences the discipline "Topics in Environmental Education", that seeks to introduce the historical, the basic concepts and the practice of the Environmental Education for the future biologist.

Another initiative at the academic level was the creation of the course of Engineering of Agronomic Production in 1994, whose proposal contemplates two emphases, one of them being the Eco-Agriculture. In the same way, the course of Civil Engineering presents an emphasis in Urban Engineering, with prominence for the control of the environmental quality in the urban areas, also present in the researches developed at the Master in Urban Engineering, which started in 1994.

There also exist initiatives of the area of environmental education the Centre of Education and Human Sciences, that is summarised to the offer of graduation disciplines ("Practice of Sciences and Biology Teaching", and "Teaching and Research in Environmental Interpretation"), some Master dissertations that are being developed and some research and extension individual projects, mainly in the area of Information Sciences. Still according to GAUDIANO (1997) the careers that have been more resisting to commit with the environmental subject are the social and humanists careers, what is not valid for the Brazilian case, where proliferate the courses and projects with focus in that area.

Some experiences on environmental education and university were disposable in a form of thesis (SORRENTINO, 1995). SOMENSON et al. (1991) present a methodological proposal to insert the environmental thematic in the university, for the Argentinean case, as a guide for the search of pedagogic mechanisms and of action, that allow to face the environmental problems with larger definition and clarity of concepts and possibilities of concrete actions, using as discussion axis the urban contamination.

Other proposals were debated, but not yet summed up, as the creation of a course of Environmental Engineering, that has been approved by the Ministry of the Education in 1994. The proposition of a curriculum that allows the formation of this new professional and its insert in the labour market are the subjects not yet solved and it has been delaying its effective implementation. Besides a proposal of a Centre of Environmental Studies exists, that can acts mainly with research and extension projects in the environmental area, through the instalment of services, even so of integrative form among the several existent groups in the University.

In the last year a group was formed by teachers and students of the most departments denominated NuclEAção, that intends to develop projects close to schools of first and secondary degrees and close to academic community.

## The creation of Special Environment Commission

With relationship to actions destined to stimulate the change of the community's behaviours, UFSCar implanted in 1990 the Eco-Agriculture Program (EAP), whose main objective is the optimization of the use of the lands of the campus of São Carlos. Among the activities of EAP stand out: agriculture-forest production; landscaping; creation and conservation of recreation areas; maintenance of areas of Legal Reservation and Permanent Preservation foreseen by the Brazilian Legislation; preservation and recovery of springs; support to academic activities etc.

At the same time came being developed studies on Energy Resources by the Internal Commission of Energy Conservation involving mainly conservation of electric energy, fuels and selective collects of garbage. Another group came developing projects of Environmental Education driven to the university community, and for students of basic schools.

Starting from the verification of the existence of formal or informal groups working in an isolated way, it was discussed by a group of teachers the creation of a structure that integrated these actions, centralising the programs and activities related with the environmental subject, being created then, to October 18, 1993 the Special Environment Commission, subordinated directly to the University Rector.

This Commission has the functions of planning and co-ordination the activities related to the development of an environmental policy for UFSCar; agriculture-forest explorations; rational occupation of the campi; support and/or development of environmental studies; preservation of natural resources; environmental education; conservation of energy; control of solid residues and of toxicant products in the campi of UFSCar and so on.

The actions of the Special Commission are structured in three programs: Eco-Agriculture Program (EAP); Program of Energy Conservation and Residues Control (PEC) and Program of Environmental Education (PEE).

Concretely, the main activities already implemented in the ambit the first Program. Thus, some areas that still present native vegetation or that they are possible to recovery were defined and registered as legal reservations, trying to also protect the fauna associated to them. A gardening project was elaborated, and it is in initial phase of implementation. In areas that were already busy with reforestation, it was made an agreement with a paper industry, foreseeing the eucalyptus plantation for a 18 year-old period. During this period, the industry will take the responsibility for the guard and protection of those areas, being avoided the risk of invasions and fires, these last ones relatively frequent in times of droughts, threatening the natural forests. In change of the use of the area, the industry will supply part of the paper used in UFSCar.

The PEC developed activities in the field of the conservation of electric energy, with studies on the consumption and the demand in the university, that allowed a better control on the expenses with this item. Besides, it was made an understanding campaign close to the community, seeking to rationalise and to decrease the consumption electricity. Another implemented activity was the selective collection of solid wastes from the campus of São Carlos, which comes working, in spite of some difficulties, since the beginning of 1994. This initiative, besides the direct effects about the community's behaviour, has repercussions besides at academic level, stimulating researches and related teaching about techniques and processes of recycle of materials, evaluation of experiences of selective collection and environmental education.

This last one has been object of attention of the third program (PEE), that already contributed to the understanding campaigns mentioned (energy conservation and selective collection of wastes). Its main activity, however, has been the accomplishment of visits with students of the basic cycles to the Trail of the Nature, a space of the campus of São Carlos in that different ecosystems can be visualised, as well as some effects of the human being action on the nature and examples of recovery of degraded areas.

## Perspectives of future performance

The current importance of the environmental subjects points for an increment on the university activities gone back to this theme, what is clearly pointed out in the "Declaration of Thessaloniki" (UNESCO, 1997). UFSCar has accompanying this tendency, incorporating in its academic performance the concerns with the environment, be natural or modified by anthropic actions. This has been happening with relationship to courses and researches already implanted, as well through the proposition of new fields of performance. A strong integration among the several groups is essential condition so that the results could be more satisfactory. In the same way, the integration with other universities can bring mutual benefits. In this sense, the participation of UFSCar in the Committee of environment of the Association of Universities of the Group of Montevideo represents an important step so that such integration is summed up in Latin America's ambit.

The most significant contribution, however, should happen starting from a stronger interaction between the university and the society, this last one represented by governmental or no-governmental instances, what is in accordance to SORRENTINO (1997). In the search of solutions for the most emergent problems, without losing of view the sustainable development, UFSCar can collaborate to improve the human being conscience in relation to its environment. Mainly, concrete actions are been putting into practice. It is, in last analysis, an strengthening of concepts and behaviours that are beyond the ecology itself, but have as basic guideline the full exercise of the citizenship. Not just a political citizenship limited to one country, but a planetary citizenship, that includes ethical attitudes in relation to the other species and to the generations that are coming.

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# Using the world of the dead to learn about the world of the living
# "A museum comes to life through Environmental Education"

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## 1 Introduction

Museums have long been accused of being "dead" - places where only old, dusty, dead things are kept which can be viewed from a distance during a brief school visit once every five years or more. Fortunately this image of museums is changing and **Environmental Education programmes** in museums are contributing to this.

In this paper you will be introduced to an Environmental Education project in a museum, which have been run very successfully for more then two years and which might serve as a model for other museums.

## The Transvaal Museum

The Transvaal museum, situated in Pretoria, is a natural history museum, where samples are kept of South African animal life. The samples are mostly in the form of stuffed animals and birds which are kept in three separate rooms. Birds are kept in the bird room, mammals in "Genesis I" and reptiles, amphibians, insects, etc in "Genesis II". A fourth room contains the rock and mineral collection of the Council for Geoscience, while other collections, such as the butterfly collection are not open to the general public except by prior arrangement.

At the museum research is conducted on their permanent natural history collections, concentrating on the classification and systematic relationships of indigenous fauna. Research is also conducted on the origin of early man and the famous skull of mrs Ples is housed here.

Most exhibits in the museum have accompanying descriptions, citing a few facts about the particular animal on display. School groups visit the museum and can be taken on a guided tour by one of the staff.

## "Project Museum" is born

As is the case with many other museums, the Transvaal museum was concerned with the way museums are perceived and wanted to improve the service they render to the public. In 1995 Mr Lourie Smit, a consultant of the museum (mainly on mammals but also on environmental education) in consultation with museum personnel decided to launch a new visitors programme, that would not only increase the number of visitors to the museum, but that would also enhance their experience and the knowledge they gained during the visit.

The Pretoria region of the Honorary rangers of the South African National Parks and a cultural movement, the "Rapportryers" were involved in the development and execution of "Project Museum".

## Functioning of the project

The target group decided on was grade seven pupils from schools in the Pretoria region. This was later extended to include schools from afar afield as Rustenburg, Brits and Bronkhorstspruit. Schools are contacted by the Rapportryers to invite them to participate by sending a group of 21 grade seven pupils and two to three teachers for a sleep-over, research visit to the museum on a particular weekend.

When learners arrive on Friday afternoon they are briefed on what their visit is going to entail and are introduced to the personnel involved. These are the museum personnel (who are responsible for serving an evening meal on Friday, the midnight feast on Friday night and a breakfast on Saturday morning) a member of the Rapportryers (who handles the briefing and the award ceremony) and an Honorary ranger of the South African National Parks who facilitate the visit. From here the Honorary ranger on duty takes over for the rest of the visit.

Learners are taken to their quarters (which is one of the exhibition halls) and then taken to the cellar where hotdogs are served. A video is then shown containing a conservation and environmental education message, followed by a discussion on it.

At this stage the learners are asked to divide themselves into three groups and to choose a group leader for each group. A teacher is allocated to each group to act as a facilitator. Group leaders now take charge of their respective groups. Group leaders hand out the learning programme booklet and the resource books to be used in the research projects. One group goes to the bird hall, one to Genesis I and one to Genesis II.

Learners have to individually choose an animal or group of animals to research. They have to log in their choice with their group leaders, who makes sure that no two learners choose the same animal. Learners then have to use the exhibit of the animal and the reference books provided to do research on their chosen animal. They also have to draw a picture of the animal. They get 90 minutes to do this. The Honorary ranger rotates between the groups to guide and direct, but leave learners to do their own research.

After the allocated time learners from one group switch places with the other groups and go to another exhibition hall where the process is repeated. When all three projects are finished it is time for a midnight feast in a hide-away room at the back of one of the exhibition halls.

Saturday morning after breakfast it is feedback time. Once more the Honorary ranger facilitates the process, but learners choose their own chairperson to direct the proceedings. Each learner is called upon to present one of his/her three projects (the chairperson decides which one) to the rest of the group. The group can then comment, ask questions, etc while the Honorary ranger also participates in sharing information, clarifying concepts and emphasising important facts.

After the feedback session learners depart to their respective homes and return at the end of the month for a presentation ceremony where all learners who attended are given a certificate and learners who did the best projects are presented with book prizes. The projects are assessed by a panel of experts in the biological and educational fields. Learners then take their parents on a "guided" tour through the museum, where they can show of their newly acquired knowledge. In this way parents are also involved in the project **and** gets to visit the museum.

Most schools give learners the chance to give feedback to the rest of the school in the following week. Learners who attended also share some of the knowledge and skills gained with other learners (especially in Biology/Science classrooms).

**The research project**

Learners get a learning programme booklet in which the questions are set and space is provided to do their work in. The following is an outline of what they have to research:

Name of animal you have chosen

Genus

Specie

Description of animal

Habitat of animal

Distribution in South Africa

Food eaten by animal

Food chain where animal fits in

Enemies

Animals it lives in symbiosis or harmony with

Status (red data)

Give reasons for status/Is it changing/Is anything being done about this?

Picture of animal

**The success of the project**

Up to now 54 schools have participated in the project. In the process 131 teachers and 1154 learners have taken part in the project. The museum is at present fully booked by groups for the rest of 1998, with many other schools interested in sending a second or even third group of learners.

**Benefits of the project**

No formal evaluation of the project has been made up to now, but many calls and letters have been received by the different parties involved from school principals, teachers, learners and parents. The following benefits were mentioned by them:

Benefits/positive effects/factors mentioned by learners

- Enjoyment of the experience (sleep-over adventure, midnight feast)
- Free choice of subjects to do research on
- Knowledge gained (of animals and of doing research)
- Knowledgeable non-interfering facilitators
- Independent work (no spoon-feeding)
- Proud of end product (satisfaction)

Benefits/positive effects/factors mentioned by schools

- Leadership development
- Communication skills development
- Knowledge gained and transferred to other learners
- Positive effects on school climate/attitude towards the environment

Benefits/positive effects/factors mentioned by parents

- Knowledge and skills gained by learners
- Knowledge gained by parents (transferred to them by pupils)
- Awareness of and positive attitudes of learners towards the environment
- Self-confidence gained by learners

Benefits to the Transvaal museum

Museum staff report the following benefits:

- A greater awareness amongst schools and the general public about the museum
- A definite increase in interest amongst schools to visit the museum with school groups
- A marked increase in sales in the museum shop

## Significance of the project in terms of Environmental Education

The project provides a novel way of imparting knowledge about the environment and in doing Environmental Education. One way of determining the significance of the project in terms of Environmental Education is to assess it against the principles and objectives of Environmental Education.

Principles of Environmental Education

The "Museum Project" adheres to the following principles

- It is holistic in that it not does not restrict itself to the animals but to peoples influence on them and peoples dependance on the environment
- It forms part of the informal education of learners which promotes life-long learning
- It adopts a interdisciplinary approach as several learning areas (such as the Natural Sciences, Art, Life orientation and Literacy) are integrated
- It adopts an integrated approach as knowledge, skills and attitudes are outcomes of the project
- It promotes diversity as it focuses on biodiversity and the conservation of all species
- It functions concentrically as it starts with a local perspective on the environment which can be extended towards a global perspective
- It is oriented towards the future as it focuses on the leaders and the decision makers of the future
- It follows a democratic approach by providing room for participation of all on an equal basis and allowing freedom of choice
- It is environmentally oriented in that it provides the opportunity for investigation and research on environmentally related matters
- It adopts a learner-centred approach as it enables and empowers learners to choose their own learning material/topics of investigation, to independently undertake their research and to make decisions
- It is society minded as parents and family members are also involved in the project and knowledge gained is conveyed to others
- It values knowledge about the environment highly

- It has an experimental approach as it allows learners the opportunity to find out what the symptoms, causes and effects of environmental problems are
- It is geared towards the development of skills such as research skills, communication skills and leadership development.
- It is centred on learning as the whole object is to provide a different/alternative and enjoyable learning experience in a unique environment
- It is geared towards action as it provides opportunities for fieldwork, research, the use of information technology and acquisition of hands-on experience
- It integrates and reinforces concepts that are essential in understanding the environment

- It sets an example for others to follow

Objectives of Environmental Education

- Realisation/awareness: The project assist groups (and individuals) to gain a positive awareness of and sensitivity towards the environment and associated problems

- Transmission of knowledge: The project assist groups (and individuals) to gain experience - and develop a basic understanding - of the environment and associated problems
- Creating/modifying attitudes: Feedback suggests that individuals were assisted in acquiring an environmental ethic
- Acquiring skills: Learners were assisted in acquiring skills in researching the aspects of the environment and associated problems
- Active participation: Some of the groups and individuals started environmental clubs, cleanups and Environmental Education workshops at their schools as a consequence of their visit to the museum.

Assessed against the principles and objectives of Environmental Education "Project Museum " seems to provide a significant opportunity to do meaningful Environmental Education.

**The way forward**

"Project Museum" is considered by all role players to be a big success and its model is already being applied in other museums in South Africa. There are at present discussions under way to improve the project by building in more variety to make it even more interesting and stimulating. Plans are also being made to involve more schools from previously disadvantaged communities.

Using the world of the dead to teach about the world of the living is alive and well in the Transvaal museum!

# Children's conception of environment in the primary school

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## Introduction

Environment educators are not only concerned with the changing environment but also with children, the future generation. Increasing numbers of children grow up in cities or spend their days in very technical environments or in virtual environments and become estranged from the countryside and real nature. What, then, are the prospects of environmental education and how should it be implemented? What is the conception of environment of a child brought up in a city or technoscape? How does it differ from the conception of environment of a child currently living in a sparsely populated country? The present study investigates the conception of environment of 11 - 12 year old Finnish children and its structure. In addition, the study attempts to identify the sources of environmental information and their potential influence on the formation of the children's conception of environment.

## Conception of `environment'

The concept of environment is often viewed as identical to the physical environment entailing both the nature environment and the built environment, but it also comprises the structure of the social environment (people environment). All this can be called as man's physical-social environment, or briefly, living environment (Aura et al. 1997, 15). The part of the environment which is made up of living organisms is called living environment.

Children and youngsters with few experiences from environment conceive the environment in a very different fashion from adults. Children living in varying environments may have radically different views of the environment. This poses special problems to environmental education. These problems have recently been dealt with in a number of investigations (Fien 1993; Payne 1996; Rubiliani & Caillon 1996).

A Finnish study (Eloranta 1996) set out to find out teacher trainees' answers to the question "What is environmental education?" The majority of the responses (80 - 90 percent) focused on the nature environment; only a few included cultural and social environment in their definition.

In Payne's (1996) research on the nature/environment conceptions and their structure of 11 -12 year old children in an Australian city it was found that the children had difficulty in separating the concepts of nature and environment. With one exception, these children did not include man in their definition of nature. They viewed nature as a relatively stable whole, with a minimum of human influence in what they call *natural nature*. Nature was seen as pure and intact. According to the results, "naturalness" was considered very important in both concepts, of nature and of environment. Indirectly, the children had adopted a negative picture of the impact of culture on the nature. On the basis of the results, Payne (1996) concluded that the setting of the children's concept formation had not taken place.

## Concept formation, structure and concept mapping

Perception and memory are fairly well-developed by the onset of school, as the conscious and voluntary memory processes become central, but concepts remain unconscious and non-voluntary. Vygotski (1982) and his research group hypothesize strongly that a concept can only become conscious and voluntary as part of a system. However, to understand a concept as superordinate, more than one subordinated concepts must be assumed. The basic members in the system of concepts are the relations to the object and to another concept. According to Vygotski (1982, 147 - 149), a child's conceptual thinking reaches maturity in puberty.

Children are not conscious of their thinking and thus unable to make logical connections until they are

11 - 12 years of age. Vygotski (1982, 165) agrees with Piaget's statement "a school-aged child is not conscious of concepts".

The individual's ontological development undergoes certain phases sensitive to influence, such as the experience of immediate environment in childhood, which are very important (Vygotski 1982, 186). According to Vygotski, the sensitive phases concern the development of purely social higher order processes in the child's cultural development on the basis of cooperation and teaching.

The age of the children involved in the present study, 11 - 12 years, is a time of change, the child is approaching puberty, but individual differences in development may be great. Some of the children at this age are still living their childhood, others are leaving it behind. Similarly, children are breaking away from the immediate physical environment of childhood and moving towards where teenagers meet, e.g. in city centres.

Concept mapping provides a way to study the student's ability to analyze concepts and their mutual relations. Maps show the student's comprehension of the issues, their hierarchy and potential inconsistencies. It is an illustration of the student's schema construction (Novak & Gowin 1984). In addition, concept mapping is fully congruent with the constructivist notion of learning.

The study of the effectiveness of environmental education has revealed certain common features in the life history of "nature lovers". Of primary significance to the awareness of and concern for the environment are personal experiences, in particular those of outdoors. The role of parents and relatives is also important; therefore, that of the school and teachers must not be underestimated (Tanner 1980, Palmer & Neal 1994).

## Sources of environmental information

Experiences from and information about the environment make it possible for the child to construct a personal view of the world and an individual conceptual structure. This forms the basis for the present study which set out to investigate what the sources are where primary school children gain their environmental information.

A number of recent studies have dealt with the sources of children's environmental information; e.g. the Eurosurvey, a large-scale study which focused on 10 - 18 year-old children and teenagers (Leol Filho 1995), Palmer et al. (1996) who studied pre-primary school children of 4 - 6 years of age, Wrangell-Katajisto (1997) who studied junior high school students in Finland, and Pawlowski (1996) whose target group were Polish university students. The results show that age, school level and major subject have an effect on the choice of the children's/students' primary sources of environmental information. The significance of the teaching materials used in environmental education in junior high school has been studied by a teacher survey (Eloranta 1995).

As far as the youngest children are concerned, the importance assigned to the teaching material varied according to the nature of the task after which the children gave their answers. On the whole, TV/video were the most often mentioned sources of information in the children's responses (Palmer et al. 1996, 319 - 321). The results indicate that the older the students are the less significance they assign to the home and school, and the influence of the media increases correspondingly. E.g. in Finland, the influence of the media, TV and the newspapers in particular, is strong on grade 9 students (15-year-olds) in comparison to that of the school (cf. Leol Filho 1995; media 60% / school 19%, Wrangell-Katajisto 1997; 85% / 12%). This finding is supported by a teacher survey in which mass media were unanimously estimated as the most important teaching material in environmental education (Eloranta 1995).

## Frame of reference and research problems

This study is based on the conception of the human's physical-social environment, living environment. How does the physical environment (e.g. landscape, vegetation or buildings) contribute to the children's conception of environment? How do different human activities and hobbies provide children with environmental stimuli?

The study approaches the sixth graders' learning of environmental concepts by means of three theoretical frameworks; experiential learning (Kolb 1982), the constructivist notion of learning (Dreiver 1988; Resnick 1987) and the process of concept formation (Vygotski 1982). These developmental processes are likely to have a simultaneous and long-term effect on the process of formation of the child's conception of environment.

The purpose of this study is to outline the conception of environment of Finnish 11 û 12 -year old children , its structure and potential factors contributing to it. The following questions were asked:
How do 11- 12 year-old children understand the concept of "environment"?
How do they organize the structure of the environmental concept?
What kind of relations are there between the conceptual structure of environment and certain factors (gender, living place, and as sources of environmental information: family/home and hobbies, school or media)?

**Method of study**

The study is a descriptive and comparative survey. The data were collected by means of questionnaires in December 1996, and they underwent both qualitative and quantitative analysis. The instrument of the study contained a number of various both structured (Likert-scales) and open questions. Control variables included e.g. gender, domicile, curricular emphasis, and sources of the student's environmental knowledge. The instrument also included a mapping task which involved constructing a hierarchical concept map containing 14 concrete environmental concepts which were provided along with a model map. The concepts represented both cityscape and nature environment. The given concepts are the following:

sea
traffic light
kiosk
forest
island
natural landscape
shopping center
cityscape
block of flats
elk
path
tram
pine
street

The subjects of this study were 11 - 12 -year old students in grade six in eight primary schools both in cities and in the countryside all over the country (in southern, western, eastern and northern Finland). The total of 244 questionnaires were sent to schools. Out of these, 76 % were returned, yielding the total of 185 subjects, 80 girls and 105 boys, to be included in the final analysis. Almost half of the subjects came from schools with curricular emphasis on environmental education.

**Results and conclusions**

*How do 11-12 -year old children understand the concept of environment?*

Children were asked to define the meaning of environment in their own words. The contents of the descriptions were analyzed into separate meanings (plants, fell, city), which then were classified into three large classes of concepts, nature environment, built environment and social environment. Two thirds of the concepts in the given content descriptions referred to natural environment (67%), while the number of concepts included in the social environment (18%) and the built environment (15%) was considerably smaller. (Antila & Heinonen 1997.)

According to the classification made the category 'natural environment' contained the following concepts: nature, vegetation (plants, flowers, trees), animals (animals, birds, foxes, etc.), water systems (rivers, lakes, oceans), various ecosystems (forest, marsh, etc.) landscapes (mountain, hill) and air/oxygen. More than half of the answers (56%) defined the environment as nature. About a fourth of the subjects listed animals, plants were mentioned by no more than 16% of the subjects. Some ecosystems were mentioned by a fifth and some water systems by almost ten percent. Even fewer mentioned nonliving things such as gases in the atmosphere (air/oxygen). (Table 1)

Table 1. Contents of the environmental concept 'nature category's and frequency of occurrences (%,f). (Total =167)

| | % | F | | % | F |
|---|---|---|---|---|---|
| Nature | 56 | 94 | Water systems | 8 | 14 |
| Animals | 27 | 45 | Air/oxygen | 7 | 11 |
| Ecosystems | 20 | 34 | Lanscapes | 5 | 8 |
| Plants | 16 | 26 | | | |

About a fourth of the students included areas inhabited by people such as villages, cities, countryside in their concept of environment. Almost one fifth of the students presented elements of man-made nature, such as yards, parks, roads and ditches. Of the answers, only 14 % included buildings in the concept of environment (Table 2). It is an interesting observation that significantly more students used the superordinate concept "man-made", which is associated with action (city, village) than separate buildings. It is also possible that concepts presented as buildings are associated with human activity. The difference of the concepts is not straightforward.

Table 2. Contents of the environmental concept æbuilt environment categoryÆ and frequency of occurrences (%,f). (Total =167)

| | % | F |
|---|---|---|
| Places inhabited by men/Village, city | 24 | 40 |
| Yard, garden, roads | 18 | 30 |
| Yard, garden, roads | 14 | 24 |

More than a fifth of the students included in their definition of the environment a number of human activities related to the social environment, such as human welfare, recycling and hobbies with utility value, such as fishing, berry picking, and industry in general (Table 3). Man as a sole component of the environment was mentioned by 11% of the subjects. Some subjects mentioned pets (dog, cat and rabbit).

Table 3. Contents of the environmental concept æsocial environment categoryÆ and frequencies of occurrences (%,f). (Total=167)

| | % | f |
|---|---|---|
| Human activities | 22 | 36 |
| People | 11 | 18 |
| Pets | 5 | 9 |

The descriptions of the environment clearly indicated how powerful and concrete the childrenÆs experience of the environment is and how it affects the child's everyday concepts. The following two examples come from boys, one from northern Finland (Lapland) and the other from western Finland (flat cultivated land).

"There are reindeer, trees, rivers, peatland, hills."
"Fruitful fields and lush forests in the countryside."

## The structuring of the contents of the concept of environment

The subjects' content descriptions were brief. They consisted primarily of objects that they could observe around them, e.g. forest, nature, lakes but specific content structuring was lacking. In particular, the answers evidenced the difficulty of defining the concept of nature as a superordinate concept (cf. Payne 1996). In the answers the term "nature" occurred as exemplified above or as in the following example.

> "Nature, forests, farmyards, roads and their environment"

These answers incorrectly equate concepts of different levels, super- and subordinate concepts (nature and forest, lakes) just as the concepts of FLOWER and ROSE in child talk prior to the structuring of the concept of flower in the Child's mind (Vygotski 1982, 169). A clearly more familiar concept to the children was animal, as the concept was used correctly as a superordinate concept: "Birds, foxes, hares, all the animals"

There was no mention of man-made built environment, neither of social environment nor of nature (e.g. water system). These superordinate concepts were strange to the subjects, whereas the term "living environment" occurred in some descriptions, e.g.:

> "It means the living environment of e.g. cats, dogs, rabbits etc."
> "Nature, living environment. A place where one lives and its close environment."

The students' descriptions also contained value judgments and affective qualities. More than a fifth of the subjects (22%) included one or more quality criteria in their content descriptions, e.g. clean nature, polluted air, beautiful landscape. This can be interpreted in a number of ways: the conceptualization process is unfinished, unconnected things heard and learned from other contexts are linked with the theme of environment or the student just wants to please the researcher by showing ecological thinking. This is an interesting finding which warrants further investigation. Examples:

> "Nature, beautiful landscape, meadows and clean air."
> "Fertile fields and lush forests"

The subjects also expressed norms of behavior of a "good environmentalist" which are obvious reflections of formal instruction.

"It means clean forest, courtyard, which I do not litter but clean instead, because I feel that it is everybody's responsibility, so I try to do my share too."

"It is great to be in the nature (when one is in the mood), and I think one has to take good care of the nature."

## Concept mapping

Constructing a concept map proved to be the most demanding task in the inquiry. A number of subjects (5%) did not do it at all and a tenth were considered as not having understood what the task implied. An acceptable concept map was defined as exhibiting a comprehensible whole constructed out of the given concepts. Other classification criteria were: use of different concepts, grouping (of concepts belonging to the cityscape and to the natural landscape), hierarchical ordering of superordinate and subordinate concepts or direct use of the given model map in the task.

More than two thirds of the respondents classified the concepts of cityscape and nature landscape into two distinct groups. Only a third of these, however, used the above major concepts as superordinate concepts under which other subordinate concepts were grouped. About a half of the subjects used all the concepts in the given word list. Nearly 10 % added concepts to the list that had not been included in the original one. A slightly smaller number (7%) tried to construct a map that was identical to the model map. This was a statistically significant finding ($p = 0.01$) among subjects who were not familiar with the technique of concept mapping. This is not only an indication of the difficulty of the task but also of the student's study skills; if individual thinking skills have not been taught and learnt, the student easily resorts to mechanical copying.

Concept mapping is a relatively unknown teaching method in Finnish comprehensive schools, especially among senior teachers. About half of the subjects included in this study were familiar with this method, which partially affected the final results of the task. The results show an interesting feature in concept mapping. The subjects who were familiar with concept mapping included own concepts (concepts beyond the original list) in their maps significantly more often than other subjects ($p=0.002$). The same subjects also used only five or less concepts out of the given list, which is a highly significant finding ($p=0.001$). The resulting maps contained a lot of good structures which, however, originated from the students' own concepts.

The results indicated that the subjects who were familiar with concept mapping also structured significantly better maps than other subjects ($p=0.005$). These subjects also had a greater confidence in their own supply of environmental concepts and their usability which was apparent in their frequent use in the maps. Difficult concepts to be placed on the maps were sea and island. Gender had an effect on mapping but the differences between boys and girls were not significant.

How are the contents of the environmental concepts related to certain control variables (family/home and hobbies, living place, media, school or gender)?

Family/home and hobbies. In the environmental context, family affected most on social interaction (visits and holiday trips). About a fourth of the respondents did a lot of berry and mushroom picking (utility value of the nature), a considerably smaller number (13%) went on nature excursions. The geographical location of the living place was influential, as apart from the rest of the subjects, those living in the north went berry and mushroom picking and on nature excursions significantly more often ($p=0.01$) than others.

Discussions with friends were chiefly related to the social environment, as the most frequent topics were mates and animals and their care (girls were interested mostly in horses). About a half of the subjects either had or had had a hobby related to the nature. The most common was scouting, then came fishing and riding/horses.

Media. The results showed that the use of the newspaper is fairly successful, although the most interesting topics are those dealing with everyday life. Environment as the field of human activity was more interesting than environment as a value in itself. Of the natural elements, animals (migratory birds) are more interesting than plants. The television was a considerably more popular source of information than the radio.

Three fourths of the students reported an occasional and a tenth a weekly viewing of nature programs on TV, whereas 13% never viewed them. According to the results, especially environmental issues dealt with on TV were significant factors in the formation of the sixth grader's conception of the environment.

School. What kind of information do the students think the school provides? Useful plants, love for 'one's neighbour, recycling and use of public transportation were among the best remembered, that is the information related to human and social activity, but also recent and concrete information. The students evaluated their own sources of environmental information according to the following values based on a diagram: school 42%, mass media 32%, home & friends 26%.

Although there was no significant correlation between the sources of information and control variables, certain trends were discernible. The subjects from schools with curricular emphasis on environmental education gave school more emphasis as a source of environmental information than other schools. Boys - more often than girls - preferred mass media (TV, newspapers) as an important source of information over other sources.

The subjects were inquired to give possible reasons for why many people oppose to plans to build a motorway through their home town. They were also inquired the source of the information that they used as a basis of the inferences. The distribution of the answers was the following: school 45%, TV 41%, home 30%, newspapers 24%. The answers may be interpreted as implying that when the topics are familiar and concrete, related discussions and treatments of issues are easier to recall than when the issues are abstract and strange.

## DISCUSSION

A number of factors have to be considered in the treatment of the validity of the study : general problems with surveys, validity of the instrument, size of the sample and coverage of sampling, analysis and interpretation of results. The instrument had undergone pilot testing and adjusted accordingly. In spite of this, concept mapping proved strange and/or too difficult for a number of the subjects. The majority of the questions were unambiguous. The final target group contained more boys than girls (105/80), also northern Finland was over-represented as domicile. This may slightly bias the results but is not likely to change the basic outline. The results provide information on the current conception of environment of 11 - 12 year-old Finnish school children. Schools with curricular emphasis on environmental education have not been focused on in this study. In general, school curricula on environmental education and their consequences warrant further investigation.

The students' answers clearly reflected the significance of their living environment, that is individual experiences, as the responses from the different parts of Finland differed. This is a significant and valuable outcome which should be considered in instruction, and in environmental education in particular.

The descriptions of the concept of environment show that the process of conceptualization is still continuing in the subjects of this study, a finding which is congruent with earlier research (cf. Vygotski 1982, Payne 1996). Given the state of the child's cognitive development it is understandable that the majority of the occurrences of environmental concepts referred to concrete natural environment, separate unconnected subconcepts and especially to the living nature. The concept of nature was unstructured and it was frequently presented as equal with its subconcepts (cf. Payne 1996). The ongoing development of the students' conception of environment was obvious from the inclusion of the built and the social environment in the descriptions, even man (although only in 11% of the answers).

The occurrence of value judgments and affective attributes in the descriptions is a very interesting finding which can be interpreted in controversial ways. On the one hand it can be viewed as a merit to environmental education, on the other it is a reflection of primitive concept formation.

The results showed that school is the most important source of environmental information in primary school. Next come the media, television in particular. It is important to note, however, that more than a quarter of the subjects also gave home or family as a personally important source of environmental information.

The results also yielded an interesting correlation between the children's sources of environmental information and their conception of the environment. As regards the relation of environmental issues and knowledge, children remembered best objects related to human activity and they were mainly interested in the social environment of their living environment. This is an indication of the importance of social learning (cf. Vygotski 1982). The results showed, however, that the environment is described and defined in terms of structures from the physical environment, mainly in terms of nature contents.

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# Urban agricultural course at Technikon SA: An "ecolative" approach

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## INTRODUCTION

The history of hunger is a history of unjust social and economic systems which, frequently in combination with ecological degradation, have marginalised the poor and deprived them of the means to eat (International Movement for Ecological Agriculture, 1990).

A research survey was conducted to determine the feasibility of offering a distance education course in urban agriculture at Technikon SA. With this course, we envisage training the trainer of urban agriculturists in sustainable agricultural practices.

The survey assisted in determining the needs for and ascertaining the role of Environmental Education as a pillar of this course. A new approach is necessary to regenerate ecosystems and assist in the socioeconomic upliftment of communities.

New opportunities must be seized and untapped potential exploited if the outcome is to result in the productive use of urban open-spaces, nutritional self-reliance, income generation, conservation and enhancement of the resource base and the empowerment of communities.

The massive increase of urban populations in Africa is only the early stage of a process that will accelerate into the next millennium (Drakakis-Smith, Bowyer-Bower Tevera, 1995:183). Heed must be taken and infra structures put in place to guide urban agriculture towards sustainability.
According to Meadows (1989:5) an American ecologist.

According to Meadows (1989:5) an American ecologist Garrett Hardin, once said that a citizen of the mode world must be educated to be literate (able to read a write) , numerate (to understand numbers) , and ecolate understand and use sustainably the complex environment systems of which he or she is a part.

The motivating factors for developing a distance education course in sustainable urban agriculture are education course in sustainable urban agriculture are mainly socioeconomic and ecological in nature. These include among others the food crisis of the poor, rapid urbanisation and unsound farming practices.

One of the most serious challenges facing Africa and the rest of the world is the production of sufficient food and work for its ever increasing population. Half of the world's people and three-quarters of the total consumption will be in cities by the beginning of the next century and problems of urban hunger, poverty an environmental degradation can only be expected to worsen (Ratta & Smit, 1993:29) . The declining ability of many cities to feed themselves and the deteriorating socio-economic conditions may aggravate this problem.

Inappropriate management of urban areas and the degradation of the biophysical environment have grave environmental consequences.

Current education systems in South Africa need a new approach of empowering learners to demonstrate competence in practice in order to improve living standards, the environment and contribute towards the national economy. An education that is success-based in philosophy and outcome-based in practice seems necessary.

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Curriculum outcomes need to indicate what the learners will do as a result of their learning experiences acquired from the course.

Educating the trainer in sustainable urban agricultural practices should provide the key to the socioeconomic empowerment of the community. For the curriculum to be aimed at sustainability a paradigm shift away from over exploitation of the environment and the associated high agricultural input will have to be made.

## METHODS

A survey was conducted in the middle of 1995, using a questionnaire as data collection instrument, which contained closed- and open-ended questions. This method was chosen on the basis of low costs and convenience. A total of 1 290 questionnaires were sent to parties concerned in the community and industry. municipalities with a city population of more than 5 000 people were targeted and 573 questionnaires were mailed to horticulturists. A total of 717 questionnaires were sent to the general agriculture and horticulture industry (489), all black agriculture schools (16) and to 162 community leaders (where information on names and addresses could be obtained).

Coding of the questionnaire for computerising was done by Lynfer Data. The type of scales used in this research survey for closed-ended questions include a Likert scale of rating (definitely to not-at-all), categorical (yes/no/unsure) and rank-ordered (rank from lowest to highest importance) scales.

A Likert scale was used to measure the intensity of opinion regarding socioeconomic, environmental and urban agricultural issues.

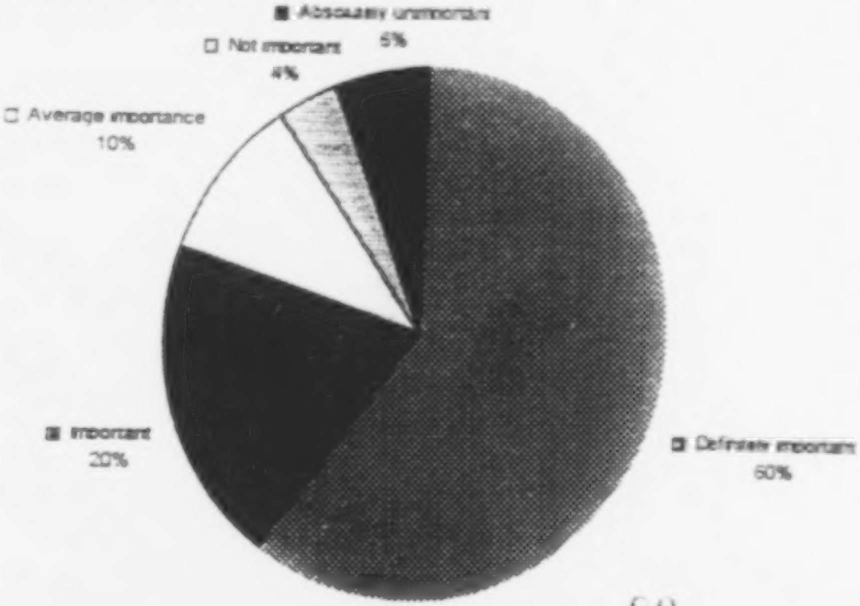
An eclectic process of analysing data from the open-ended questions was adopted. Kerlinger's (1992:477) method and Tesch's (1990) method (in Cresswell, 994.55) were combined to develop categories and sub-categories from emergent themes.

## RESULTS

Respondents returned 273 questionnaires from the total of 1 290 mailed, representing a response rate of 21,2 per cent.

- Most respondents (80, 8 per cent) believe that a course in urban agriculture is important (figure 1). & The majority of respondents (93,3 per cent) indicated that between one and ten of their staff members would be interested to enrol in a course in Urban Agriculture. In 84,5 per cent of all cases the respondents indicated that they know of between one and ten other people who would be interested in studying this course.

**Fig. 1 Importance of a course in Urban Agriculture**



- The largest percentage of the respondents regarded user-friendly study guides plus workshops as the best media to use for this course, followed by the written word plus video cassettes (figure 2).
- More than half of the respondents (66,3 per cent) felt that it was possible for a technical course in Urban Agriculture to be offered country-wide through distance education, while 15 per cent thought it was not possible and 18,7 per cent of them were unsure.
- The majority of the respondents (87,5 per cent) felt that it was necessary to improve the technical knowledge and skills of horticulturists, trainers/extension officers, farmers, teachers and community leaders regarding urban agriculture (table 1).
- Most respondents (83, 5 per cent) regarded a course in urban agriculture, based on healthy and sustainable food production, as important (table 1).
- A large percentage (87,5 per cent) of the respondents felt that population growth influenced food security, and 84,2 per cent though that urban open spaces should be used more productively (table 1).
- The majority of the respondents (90,8 per cent) felt that it was important to reduce the food crisis of the urban poor. in South Africa, while 78,0 per cent believed that urban agriculture could contribute to job creation (table 1).
- While 87,3 per cent of the respondents were of the opinion that organic domestic waste products and waste water could be used more productively in urban agriculture, 93 per cent envisaged a need to teach people how to produce their own food through the sustainable use of resources (table 1).
- More that half of the respondents (60,8 per cent) felt that a high input of fertilisers and pesticides in agriculture had a negative influence on the environment and human health (table 1).
- 74,9 per cent of the respondents regarded environmental education as important in agriculture (table 1).

Table 1 Percentage of respondents indicating their intensity of opinion on statements (n=273)

| STATEMENTS | DA | A | U | D | DD |
|---|---|---|---|---|---|
| It is necessary to improve the technical knowledge and skills of horticulturists, extension officers, farmers, teachers and community leaders and trainers regarding urban agriculture | 70,0 | 17,5 | 7,4 | 2,0 | 3,1 |
| A certificate course in urban agriculture based on healthy and sustainable food production is important in the new South Africa | 56,0 | 27,5 | 10,6 | 4,1 | 1,8 |
| Population growth influences food security | 70,0 | 17,5 | 7,4 | 2,0 | 3,1 |
| Urban spaces should be used more productively | 65,8 | 18,4 | 8,1 | 5,9 | 1,8 |
| Urban agriculture should contribute to ob creation | 52,6 | 25,4 | 12,5 | 7,7 | 1,8 |
| It is important to reduce the food crisis of the urban poor in South Africa | 70,0 | 20,8 | 5,5 | 2,2 | 1,5 |
| There is a need to teach people how to produce their own food through the sustainable use of resources | 71,5 | 21,5 | 2,5 | 2,5 | 1,8 |
| Domestic waste products and waste water can be used more productively in urban agriculture | 64,0 | 23,3 | 8,7 | 3,3 | 0,7 |
| High input fertilisers and pesticides in agriculture have a negative influence on the environment and human health | 38,9 | 21,9 | 21,1 | 15,1 | 3,0 |
| Farmers should accept responsibility for environmental offenses | 52,6 | 22,3 | 19,3 | 4,0 | 1,8 |
| Environmental education is important in agriculture | 72,4 | 21,7 | 4,1 | 1,1 | 0,7 |

DA = Definitely Agree; A = Agree; U = Unsure; D = Disagree; DD = Definitely Disagree

Emerging categories and sub-categories from the openended question on how urban agriculture can contribute to environmental education, are given in (Table 2).

| MAIN CATEGORY | MAIN CATEGORY | QUANTITY |
|---|---|---|
| 1 Sustainable development:<br>* Social sustainability | - Self-sufficiency in basic needs<br>- Food and uses of plants to benefit people<br>- Social participation and interactions and community farming<br>- Decision-making<br>- Recreation<br>- Empowerment of community and building capacity<br>- Sustainable living | 7<br>7<br>8<br>3<br>2<br>10<br>1<br>38 |

| | | |
|---|---|---|
| • Environmental sustainability | - Serve, protect, conserve and improve the environment | 9 |
| | - Create a sustainable city | 4 |
| | - Create a love for nature and an interest in environment | 4 |
| | - Better use of available land and integrate the community and city | 4 |
| | - Create environmental awareness, consciousness and sensitivity | 21 |
| | - Beautify the environment | 6 |
| | - Take responsibility for the environment/ participatory action | 3 |
| | | **51** |
| Economic sustainability | - Generate income and stimulate economy | 4 |
| | - Create jobs and employment opportunities | 7 |
| | - Provide business participation and benefits | 5 |
| | | **16**<br>(36,3%) |
| 2 Conservation of resources and preservation of biodiversity | - Prevention of air pollution and soil erosion and protection and conservation of top soil and water (sustainable use of natural resources) | 36 |
| | - Preserve and encourage communities to plant greenery (herbs, trees, edible and medicinal plants) | 9 |
| | | (15,6%) |
| 3 Natural resource management in urban agriculture | Better utilisation and management of resources and an awareness of vulnerability of urban resources | 11<br>(3,8%) |
| 4 Urban agriculture as an environmental education, training and teaching strategy | 4 Urban agriculture environment better and become more conscious of it and teach ecological principles | 6 |
| | - Provide job experience and productive use of urban open-spaces | 13 |
| | - Educate the community and school pupils and teach them skills | 14 |
| | | (11,4%) |
| 5 Ecological urban agriculture | - Teach sustainable land management practices | 4 |
| | - Promote environmental education through agricultural teaching; (association of soil science and plant nutrition, teaching low-impact technology and design, permaculture methods, organic fertilisation, dangers of pesticides, fertilisers and chlorinated water, environmental friendliness) | 30 |
| | | (11,8%) |

| | | |
|---|---|---|
| 6 Improving the urban environment and preventing problems | - Provide knowledge and create interest in production of edible plants | 11 |
| | - Teaching skills (crop rotation, intercropping, resource utilisation management of urban wastes) | 26 |
| | - Improvement of health, sanitation and clean environment | 6 |
| | - Teaching consciousness of pollution, degradation of environment, commitments, involvement and responsible actions | 16<br>(20,4%) |
| 7 No major impact | Do not know. Perhaps the wrong focus | 2<br>(0,7%)<br>N=289 |

## DISCUSSION

From the results, there seems to be sufficient interest in a course in Urban Agriculture through distance education, supporting the feasibility thereof.

It seems as if the respondents foresee a substantial practical component to the course, judging from their strong preference to user-friendly study guides plus workshops.

The strong support to improve knowledge and skills and the fact that the course should be based on principles of sustainable agriculture are supportive of the need for ecological agriculture. This is echoed in the sustainable use of resources and the recycling of waste products and water.

From a socio-economical point of view it appears as if the respondents regard urban agriculture as conducive to job creation and relieving the food crisis of the poor.

The concern that population growth influences food security can be linked to the need that urban open-spaces should be used more productively.

Other concerns pertaining to the high external input of fertilisers and pesticides and their negative influence on the environment and human health emphasise the need for environmental education in the course.

There seems to be agreement that farmers should accept responsibility for environmental offenses. It is therefore not surprising that environmental education is regarded as important in agriculture.

The main categories emerging from the open-ended question are indicators of the respondents' view on urban agriculture's contribution to environmental education. The strongest category (36,3%-), 'Sustainable development", includes social, economic and environmental sustainability, and each of these is paramount for the improvement of the quality of life.

"Improving the urban environment and preventing problems" is the second strongest category (20,4%-), indicating the importance of knowledge, skills, a clean environment and a commitment to act.

The other categories in order of diminishing importance are:

- "Conservation of resources and preservation of biodiversity' (15,6%)
- "Ecological urban agriculture" (1118%)
- "Urban agriculture as an environmental education, training and teaching strategy" (11,4%)
- "Natural resource management in urban agriculture" (3,8%)

The category "no major impact", was least important (0,7%).

Outcomes based on the protection of the environment and resource conservation are important for sustainability. This will demand that specific outcomes conducive to responsible actions, critical thinking and practical problem-solving skills of students should be developed in the course. Students should be empowered to train urban agriculturists in becoming practically competent people who can apply sustainable agricultural practices. Outcomes based on socioeconomic empowerment of the community may include sustainable food production, entrepreneurship and the improvement of nutrition and health. Specific outcomes that apply the integration of knowledge to solve socioeconomic problems and over exploitation of natural resources should be included in the curriculum. Infusion of environmental education with ecological agriculture may assist in optimising conservation practices and production of crops and cultivate environmentally literate citizens.

Integrate as many sources of information as possible to educate and train communities on the adverse effects of unsustainable environmental practices.

The course should include specific outcomes pertaining to the sustainable and productive use of urban open spaces that contribute to socioeconomic and ecological upliftment.

Specific outcomes pertaining to values and appreciation for aesthetics could lead to positive attitudes and an awareness, concern and appreciation of the environment.

## CONCLUSION

The data revealed the feasibility of a course in Urban Agriculture based on sustainable use, management and understanding of the environment. This implies that trainers and urban agriculturists should be able to ecolate. Further research is aimed at the assistance of local government in reconstructing and developing sustainable cities that will alleviate poverty and stimulate economic growth.

It seems as if an outcomes-based approach to education is needed for this course and that sustainability should be endorsed.

Seeking solutions to the following probing questions may help us in our quest for sustainability:

1. CAN THE VALUE SYSTEM OF HUMANITY ("UBUNTU") BE ACHIEVED IF WE DO NOT RESPECT THE DIGNITY OF ALL HUMAN BEINGS?
2. CAN WE ALLOW THE DEPLETION OF NATURAL RESOURCES TO CONTINUE WITHOUT CONTEMPLATING ALTERNATIVES?
3. SHOULD WE SIT BACK AND ALLOW THE POLLUTION OF SOIL, WATER AND AIR TO CONTINUE ITS DETRIMENTAL AFFECT ON HUMAN AND ANIMAL HEALTH?
4. CAN WE ALLOW HIGH-INPUT AGRICULTURAL PRACTICES AND UNSUSTAINABLE FARMING PRACTICES TO RUIN OUR ECOSYSTEMS?

An outcome-based( approach to the curriculum seems necessary to improve the quality of life in urban South Africa - and to take action in bringing about the vision of social, economic and ecological transformation.

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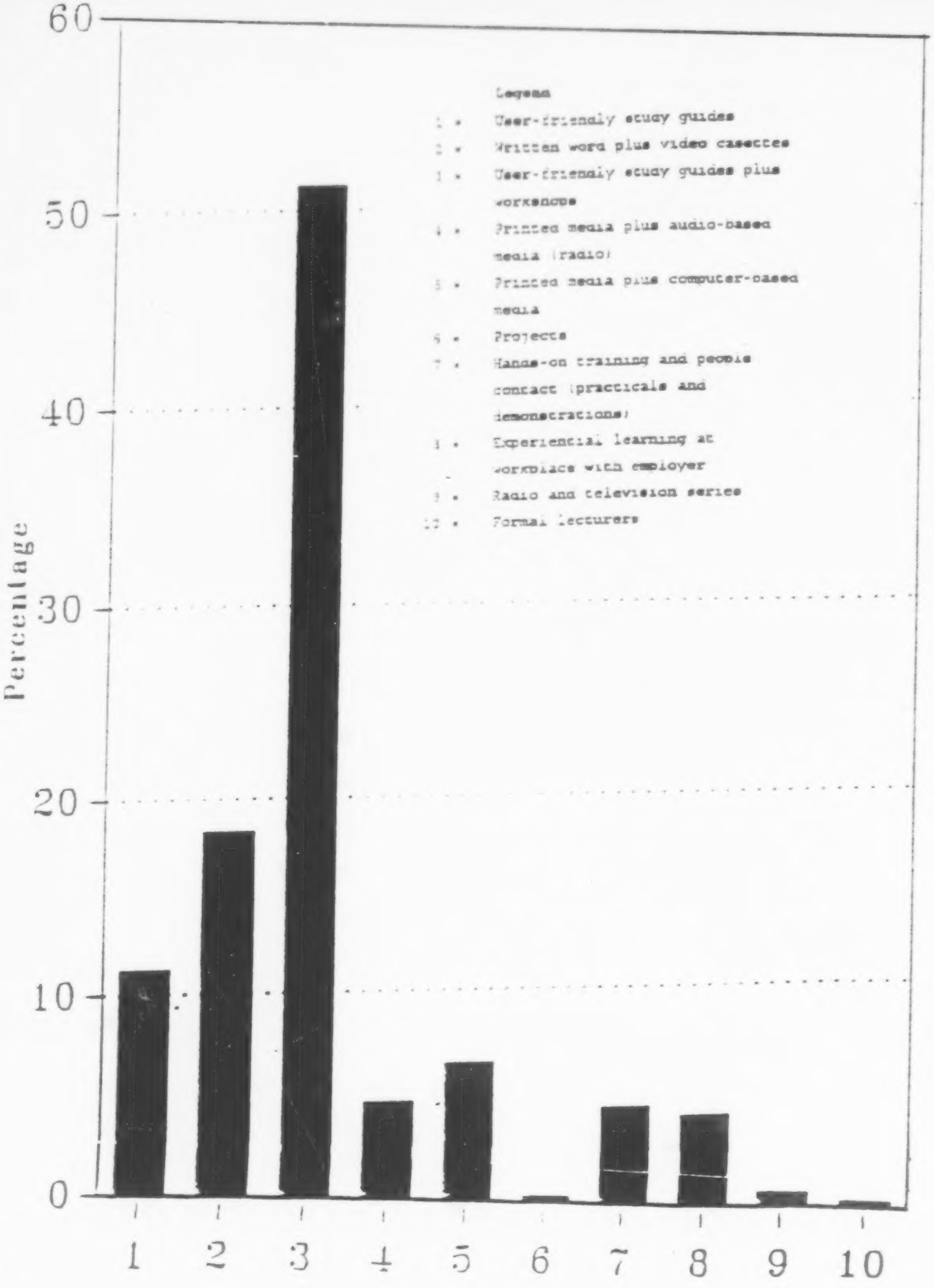

Fig. 2 Medium for the course

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# Environmental education - an industrial perspective

***Troy Govender***
***Pr. Sci. Nat.March 1998***
***Senior Environmental Advisor***
***Eskom, Distribution***

## 1. *Some thoughts*

> *"No longer is the environment the concern of a few specialist industries, but it now shapes the future of the world. Whilst the need to consider environmental issues is accepted, now is the time to convert this into positive action."*
>
> Duncan Matthews, NatWest Technology Unit

> *"Industry has a real contribution to make to help this process (environmental well being and economic development) by giving greater focus to environmental education and training initiatives."*
>
> Earth Summit, Rio de Janeiro, 1992

## 2. *Environmental Facts:*

2.1 *building blocks:* (land, air, water,vegetation, animals, man)
2.2 *environmental problems:*

Population explosion, deforestation, desertification, Ozone depletion, Greenhouse Effect/global warming, acid rain, depletion of indigenous/protected flora and fauna, air, land and water pollution, waste, soil erosion, litter, abuse of non-renewable resources (e.g. water)

## 3. *Environmental Risks to industry*

(a) *Hazardous substances*, e.g. oils, P.C.B.'s (Askarel), herbicides
(b) *Physical damage*, e.g. veld fires, vegetation/habitat destruction, soil erosion
(c) *Wildlife interactions*, e.g. at Eskom bird collisions and electrocutions, animal (giraffe, monkey, etc.) electrocutions, bird excretions, flashovers/outages/loss of supply, power interruptions/quality of supply
(d) *Legislation*, e.g. Constitutional rights, New Regulations to Environment Act, Capacity of various levels of government
(e) *Project delays and cancellations*, e.g. inadequate environmental input, ecological concerns
(f) *Low level of environmental expertise of line staff*
(g) *Electric and magnetic fields*
(h) *Public criticisms and negative publicity*

## 4. *Environmental Management challenge has three dimensions*

(a) to make business more effective and its environmental impact more acceptable;
(b) to identify and realise potential for environmental good practice;
(c) to change management practice to address the new challenges

## 5. *The drivers for good corporate governance*

(a) public pressure
(b) new standards and legislation
(c) new business opportunities
(d) reduction of risk
(e) ethical considerations

### 6. *Global Trends in Industrial Environmental Management*

(a) Technological (east - Eastern Tigers)
(b) Command and control (west - USA)
(c) Self regulation (north - Europe)
(d) Muddling along (south - Africa)

### 7. *Environmental Education in Eskom*

7.1 *Customer Interface Training: Eskom and the Environment*

The effective implementation of E.I.A.'s and E.M.P.'s depend on an environmental aware and educated workforce. Eskom is fully aware of this and has instituted an Eskom Certificate of Environmental Competence Programme, with various courses, appropriate to the different job functions, for all its employees. Many of the courses form part of the Customer Interface Training (C.I.T.) in order to ensure to widespread implementation.

Legendary C.I.T. is available to all customer interface employees in the Distribution Business. These training modules satisfy the accreditation requirements of Eskom Allied and Industry Training Board (E.A.I.T.B.) for future national recognition of competence.

All development and design work was based on customer requirements, thereby ensuring that this interface training is linked to satisfy real customer needs.

The Eskom and the Environment objective is to make all employees aware of the environment and encourage them to treat it with respect and assist with customer problems/issues which are environmental related. This module is a basic awareness of Eskom's policy and initiatives regarding the environment and is for all employees who interact with the customer.

To date, ***4 554*** Distribution employees, representing approximately 11,7% of its employees, have completed this first module. The module consists of the following main themes.

(a) Global Environmental Problems
(b) Generation Environmental Problems and solutions
(c) Bird Interactions with electricity infrastructure
(d) Other aspects of Eskom's Environmental Management strategies

A further, more advance module was also designed for managers and has begun its roll-out in November 1997.

Further advanced modules, education and training programmes are currently being designed.

7.2 *Observation of Universal Environment Day celebrations*

Communication messages on the significance of World Environment Day (5 June) and Arbor Day (5 September) were conveyed throughout the Distribution Business using the electronic system. Talks, videos and other activities were also held to mark these days. Tree planting ceremonies were held at most Eskom offices for Arbor Day.

7.3 *Employees also attend courses at outside institutions*

7.4 *Environmental Education externally*

The Enviro project - environmental education resource for schools and youth groups was successfully undertaken with more than 25 junior and secondary schools participating in eight provinces and Swaziland. The high level of success was largely due to the newly established partnership between Eskom and the Wildlife and Environment Society of South Africa (WESA). WESA with their environmental education resources and education centres provided support to the various groups who entered the competition.

### 8. *The Way Forward*

(a) Trust + Control = *k*    where *k* = good environmental performance
(b) Risk = Hazards + Outrage
(c) Ways to save the environment
(d) Sense of community

### 9. *Concluding thoughts*

We must make environmental education a part our lives. If education is encouraged, citizens will understand and take on their roles as stewards of this Earth.

When we talk about environmental issues, we usually refer to the air we breathe, the water we drink or the food we put on the table. No doubt, these issues are critically important. But to me, environment is more than that. It is about the sense of community. A sense of community is the obligation we have to each other and to future generations to protect God's earth.

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# The contribution that technology can make as a field of study, in developing learners to interact meaningfully with the environment

*Mr Mischack Gumbo*

## 1. INTRODUCTION

A CNN report was made at the end of 1997 about the uneasiness of biological life in the far Northern Pole caused by global heating - that sea life is being threatened by the melting of the ice deposits, and human' life also, by the envisaged possible flooding. The starting of the summer season in the second semester of 1997 has also threatened the success of farming in South Africa by the predicted El Nino effects.

The views expressed here point to the increasing need to invigorate environmental educators and educators in the mission of developing their learners to be environmentally conscious. The Belgrade Charter by UNESCO regarding environmental education bears relevance to that effect. According to this Charter (Gould 1992:10), environmental education should help individuals and social groups to develop:

- awareness of and sensitivity to the total environment and its allied problems;
- an understanding of the total environment, its associated problems and humanity's critically responsible presence and role in it;
- strong feelings of concern for the environment and the motivation for actively participating in its protection and improvement;
- skills for solving environmental problems;
- skills for evaluating environmental measures and educational programs in terms of ecological, political, economic, social, aesthetic and educational factors, and
- a sense of responsibility and urgency regarding environmental problems to ensure appropriate action to solve these problems.

It is in the light of the above exposition of claims that this paper purports to unravel the nature of technology as a field of study and its relevance to develop learners regarding the issue of environment.

## 2. UNDERSTANDING TECHNOLOGY AS A FIELD OF STUDY

A literature on technology reveals a hardly exhaustible list of definitions of technology. The definitions of the terms **technology** and **Technology Education** are given subsequently.

### 2.1 Technology

For the sake of this paper, the following definition of technology is given by Treagust and Mather (1990:53):

***Technology*** is the know-how and creative process that may utilise tools, resources and systems to solve problems, to enhance control over the natural and man-made environment in an endeavour to improve the human condition.

From this given definition it is clear that the overriding issue is that man wants to improve his living condition in the environment as he interacts with it in a creative way. This improvement is the crucial point in the sense that man should also employ his critical thinking in his manipulation of the environment. Thus, technology is a socially-driven phenomenon (Lycoudi, 1996:33) that applies human knowledge to solve existential and practical problems in the environment. In that sense it is important to hold the views of Williams and Jinks (1985:50) that "technology itself is not evil. It is the way man uses it that determines its value and so it is very important that technological awareness should begin in the primary school".

## 2.2 Technology Education

HEDCOM (1996:12-13) defines Technology Education as follows:

Technology Education concerns technological knowledge and skills, as well as technological processes, and involves understanding the impact of technology on both the individual and society. It is ultimately designed to promote the capability of the learner to perform effectively in the technological environment he/she lives in, and to stimulate him/her to contribute towards its improvement. This capability should be reflected in:

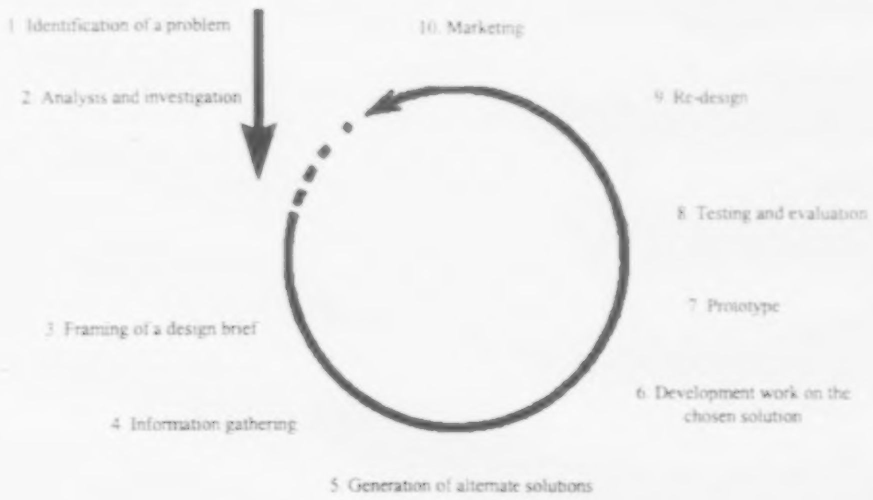
- the effective use of technological products and systems;
- the ability to evaluate technological products or processes from functional, economic, environmental, ethical, social and aesthetic points of view; and
- the ability to design and build appropriate products to functional and aesthetic specifications set either by the learner or by others.

It can be gathered from the foregoing definition of Technology Education that unlike focusing on only the benefit that man can earn from technology, learners are also developed to have skills of handling the environment in a responsible way. They are required to work technologically within the given specifications according to which they can evaluate their artefacts. As they develop these skills they also succeed in solving environmental problems (Balogun, 1996:7). Thus, the claim made by Walstra (1996:39) is relevant here, that Technology Education and caring for the environment go hand-in-hand.

## 3. THE TEACHING METHODOLOGY FOR TECHNOLOGY EDUCATION

The Technology Education methodology can be better fathomed through the technology process within which it exists. This technology process is depicted as follows:

Figure 1: The Technology Process


1. Identification of a problem
10. Marketing
2. Analysis and investigation
9. Re-design
8. Testing and evaluation
7. Prototype
3. Framing of a design brief
6. Development work on the chosen solution
4. Information gathering
5. Generation of alternate solutions

Source: Treagust and Mather (1990: 54)

The given technology process denotes the need for a learner to be responsible for his activities regarding the environment. According to Eisenberg (1996:37) the technology process serves as a backbone of the methodologies such as systems approach, integrated approach, etc. and it comprises three main stages, which are:

- Design, which incorporates the brief of the need, problem, challenge or opportunity, investigation, initial ideas, selection and justification of the optimal solution and the development of the chosen idea;
- Planning and making, the instrumental domain which principally involves planning, cost effective and efficient methods of making, use of hand and machine tools, processing of material, safety considerations, finishing, quality assurance, etc.; and
- Evaluating, using and marketing, where a learner assesses, by experimenting and testing, whether the end product complies with the initial needs and specifications; develops technological intelligence as a user and a consumer, maintains and improves existing systems and markets the product. This evaluation is an ongoing process throughout the technological process with short and closed feedback loops.

## 4. TYPES OF TASKS AS COVERING ENVIRONMENTAL ISSUES, VALUES AND ATTITUDES

It must be born in mind that technology is a process, a way of thinking and doing (Gilbert, 1990:25). It is required, then, that learners should be involved practically with the environment either on their individual capacity or in groups in which they pick up problems, analyse them, design and make solutions to such problems, and evaluate their solutions - they engage in a design-make-evaluate process. For what reason there are three important types of tasks through which technology learners are developed which should be carried out through project work. They are given by HEDCOM (1996:15) as follows:

### 4.1 Case Study Tasks

These are nominally short, structured tasks which aim to link learning in schools with technological experience in the wider community (i.e. post offices, power stations, factories, farms, etc.). They should provide a vehicle for examining the ethical, social and environmental issues related to the development of technology and its application.

### 4.2 Resource Tasks

They are generally short, structured tasks which aim to develop learners' resources of technological knowledge and skill. They may nevertheless include some elements of design and problem-solving.

### 4.3 Capability Tasks

Capability tasks are extended, open-ended tasks in which learners are required to use a range of resources (including the knowledge and skill required in earlier activities) to design, realise and evaluate solutions to technological problems.

These given tasks, embedded in the methodology for the teaching of technology encourage learning which according to HEDCOM (1 996:15):

- is activity-based;
- integrates thinking and action within the context of technological problem-solving;
- involves learners in decision-making, being able to justify choices made, competition and elf-evaluation;
- involves collaborative and individual work; and
- links work with technological activities in the wider community.

and people are worried by such conditions if they are bad for their living (Conway, 1994:1 1 1). In the light of the given tasks above and how they improve learning, learners are able to detect and solve environmental problems related to technology. A range of problems such as the following could be addressed:

- environmental pollution especially in townships, littering, extinction of trees through a large-scale urbanisation, and emission of smoke which have a direct influence in the atmosphere (Gumbo, 1995:6);
- the followed sense of renewable and non-renewable resources seems not to be holding anymore because it looks the renewable resources are now the ones growing scarce as the clock ticks away, e.g. water, forest, fish, etc. (Matthews, 1991:42);
- many developing countries are extremely sensitive to environmental problems (than developed ones) because their income strongly depends on the exploitation of natural resources (Van Pelt, 1993:34);
- among the most important processes that bring about environmental change are the biogeochemical cycles which effect the transfer of materials between the atmosphere, hydrosphere, lithosphere and biosphere (Mannion & Bowlby, 1992:39); and
- the estimated environmental stress indices for pollutants between 1991 and 2000 - 2030 in the following table.

Table 1. Estimated environmental stress indices for pollutants

between 1991 and 2000 - 2030

| | | 2000-2030 |
|---|---|---|
| Heavy metals | 90 | 130 |
| Radioactive wastes | 35 | 120 |
| Carbon dioxide | 75 | 75 |
| Solid wastes | 35 | 120 |
| Waterborne industrial wastes | 35 | 80 |
| Oil spills | 40 | 70 |
| Sulphur dioxide and sulphates | 20 | 70 |
| Waste heat | 5 | 70 |
| Nitrogen oxides | 20 | 36 |
| Litter | 20 | 40 |
| Pesticides | 30 | 130 |
| Hydrocarbons in air | 10 | 20 |
| Photochemical oxidants | 15 | 20 |
| Carbon monoxide | 10 | 15 |
| Organic sewage | 20 | 40 |
| Suspended particulates | 20 | 90 |
| Chemical fertilisers | 30 | 50 |
| Noise | 5 | 15 |

Source: Hansen and Jorgensen (1991:8)

## 5. AN EXPERIENCE OF THE AUTHOR AS A LEARNER

It is sometimes difficult to even start to appreciate the environment when a problem has not first being realised. A sense of responsibility, respect and caring for the environment becomes registered as soon as a learner practically identifies a problem in the environment and takes a stop to explore and solve it. This is exactly what happens in a technology class. Learners are engaged from time to time in project activities where they follow a design-make-evaluate process to solve problems.

This idea of involving learners actively in technological tasks also helps to change their perceptions and attitudes towards the environment, especially because they normally engage in group work activities where they become informed as to how they should solve problems from their different cultural, . physical, political, etc. backgrounds. The secret is in building the technological product from given specification (for economic reasons), cleaning up the area afterwards (which gives meaning for a sense of beauty on the environment) and admiring the product made (as well as evaluating it against the environment and specifications). Thus, the learner becomes an important contributor to the process of sustainable development.

## 6. CONCLUSION

Technology as a field of study has been described. Its relevance for environmental awareness and education has been outlined. Through the commitment of the teacher as a facilitator leading the creative design-make-evaluate process for learners the success of environmental education can be determined. It becomes imperative, then, that environmental education within fields of learning should be included in the curriculum for in-service training of teachers-on-the-job, and for teacher-trainees. The idea should be that school's commitment on environmental education should disseminate into the communities.

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# Environmental education for all - including the learners with special educational needs

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Learners with special educational needs form part of the world, but quite often their needs are not addressed. One of the big aims of Environmental Education is to teach people and especially young learners values and respect for the environment. It can also offer an excellent opportunity to teach respect for others, respect for the dignity and the rights of others.

In this paper I would like to introduce you what I call the two worlds of learners with special educational needs (LSEN), i.e. both the abilities and the disabilities of these learners. This might be helpful when training educators to deal with the special needs of these learners or it can also be useful when working in the the field of environmental education. The needs and especially the learning and social needs of learners with special educational needs will be included.

## Who are the learners with special educational needs?

Quite often we think of learners with special needs only in terms of persons with disabilities. One should, however, take cognisance of the fact that special educational needs is a much broader concept which also includes people with language barriers and learners who are at risk as far as learning is concerned because of extrinsic factors such as poverty and lack of exposure.

In the South African Public Discussion Document of the National Commission on Special Needs in Education and Training (August 1997) the following criteria are accepted to describe learners with special educational needs (LSEN). When reading through these criteria you will realize that LSEN is indeed a broad concept:

- learners with disabilities who may need to use specialised equipment or assistive devices to participate in the learning process
- learners who experience some form of learning breakdown as a result of difference in learning style or pace (e.g. a learners who learns at a faster or slower pace than the others in the classroom)
- learners who are at risk for personal or social reasons (e.g. a learners who is abused at home, misses school and drops out as a result, or a learner who has HIV/AIDS)

In this Discussion Document it is suggessted that instead of refering to learners with special educational needs, one should refer to learners who experience barriers to learning. The term learners with special needs is, however, widely and internationally used and will be used in this paper. What is important is the fact thal all learners should have barrier free access to all centres of learning.

## Manifestation of Special Education Needs

The special educational needs which learners may have, can manifest in various ways. Problems which learners experience can manifest as disabilities, learning and emotional problems and behaviour and developmental problems. Learning problems usually occur at school entry and in the primary school phase. Behaviour problems occur in the primary school, but to a greater extent in the secondary school. Disabilities are usually permanent and will therefore also occur at tertiary level.

## General comments regarding the teaching of LSEN

It was stated in the introduction that one should concentrate on the **abilities** of LSEN instead of focusing on their disabilities. Quite often LSEN have well developed abilities which other learners do not necessarily have, for instance learners with behavioural problems often have strong leadership qualities and the other senses of a person with partial vision or a blind person are extremely well developed.

It is important that one should not talk about disabled or handicapped persons anymore, but reference should be made of a person with a disability. Almost all of us have at some stage of our lives a disability and as we grow older the likelihood of a disability increases. As we grow older almost all of us loose our perfect vision or excellent aural abilites, we become slower in our movements and we cannot always rely on our memories anymore. It is in fact quite normal to have some kind of a disability at a later stage of our lives. Why shouldn't we accept a disability a person experiences at a younger stage as something normal too?

LSEN and all person with disabilities should be regarded as part of the society and one should not hesitate to take them into any appropriate social structure. LSEN should under no circumstances be treated differently. They should be addressed in the same way as any other person. This is line with the new paradigm of normalization which is accepted in many countries.

If perhaps one is dealing with a learner with a physical or visual disability in a group and one is not quite sure what assistance to render to this person, do not hesitate to ask what assistance he or she would prefer to receive. This should not be done in a group situation. One should try to avoid any circumstamce which might be humiliating to a LSEN.

Every LSEN is a unique person and the problems and disabilities among LSEN differ from person to person. The uniqueness of every learner and every LSEN should always be remembered. For Environmental Education to be successful both the cognitive and emotional development of learners and LSEN as well as their social development should be stimulated.

### Learners with physical disabilities

Learners with physical disabilities including cerebral palsy have all the abilities other learners would have. They are very keen to take part in all activities and to share in the experiences which the other learners would have. It is a pity that because of a lack of facilities learners with physical disabilities are often denied experiences which they would dearly like to have. Persons with physical disabilities quite often have a good sense of humour and are able to laugh at themselves and their own disabilities. The biggest problem these learners have to face is their mobility and as a result of their immobility they do not have access to all places and facilities.

It is important that the buildings, classrooms, toilet and washing facilities are made accessible to people with physical disabilities. Furniture and apparatus in a classroom should be arranged in such a way that a learner with a physical disability can move about freely. If there is an activity both indoors or outdoors which a learner with a physical disability will not be able to do, be innovative and plan an activity which this learner will be able to do. One should never let a learner with a physical disability simply sit and watch while the rest of a group takes part in an activity. If there is absolutely no activity which such a learner can do, an educator can still involve this learner as his or her assistent, as a superviser with special duties or as a score keeper.

It might be a good idea to make a learner with a physical disability who does not have speech or language impairments, the leader of a group. This will offer this person the opportunity to do the report back and to do tasks which he or she can do. A wheelchair can be a handy if one is doing an outdoor activity because the learner in the wheelchair could help to carry books, pamphlets, pens and pencils.

### Learners with visual disabilities

Visual disabilities can range from complete blindness to partially sighted. It is unlikely that one would be handling a blind learner in a group of learners. Blind learners would usually be a group on their own for which special arrangements and adaptations in the environmental education setup should be made.

Some braille trails and fragrance gardens have been introduced in certain botanical gardens. Braille trails should be smooth and level as possible. These trails offer blind or visually impaired persons certain labels which help them to interpret certain features that may be felt, smelled or heard. Fragrance gardens are usually elevated flower beds, the height of a person sitting a wheel chair and with handrails for the visually impaired, that display strongly scented plants.

When dealing with learners with visual disabilities outdoors one should remember that as a result of their visual impairment their other senses are very well developed. One could therefore really make use of these learners' strong abilities. They would for instance be much more able to discriminate between sounds in an urban setting or in the veld than their classmates with good visual abilities. They fare usually very good in the identification of textures and shapes. When planning activities for a learners who is blind of who has a visual impairment one should include activities in which aural abilities and the touch sense are used.

Learners who have visual disabilities are afraid to move and run about freely because they cannot see what is in front of them. They will only move fast if they feel secure in a particular environment. When planning activities one should remember to include activities which do not involve much movement. One should also ensure that learners with visual impairment should be helped to get to know the environment in which they are moving.

It is a problem for blind learners and those with visual impairment to do written work or to make drawings. One should plan for this problem by asking another adult to take down notes for such a learner or to let the learner make use of a tape recorder.

One should remember that learners who suffer from albinism usually have visual disabilities too. They are also very sensitive to sunlight and provision should be made for them to stay in the shade.

### Learners with hearing disabilities

Hearing disabilities can range form deaf to hard of hearing. The biggest problems which these learners face are the underdevelopment of their language abilities and communication skills. This in turn restricts their interaction with the world and fellow human beings. When learners with hearing disabilities do not wear hearing aids their disabilities are not visible and their lack of communication or cooperation is often misinterpreted.

When teaching learners with hearing disabilities one should make use of these learners' well developed visual abilities. They can observe very well and tasks requiring their visual abilities should be included in their activities. Quite often these learners are very fond of and gifted in drawing, painting and sculpting. They should never be asked to do oral report backs.

When addressing a learner with a hearing disability, one should speak clearly and perhaps a little slower than normally. One should make sure that the learner is able to do lip reading by not standing against the light and not covering one's lips with a book or one's hands. One should not talk to a group while standing with one's back to them, for instance when writing on the blackboard. One should make sure that a learner with a hearing impairment understands an assignment and all the instructions especially when he or she is requested to do an outdoor activity.

### Chronic diseases

It is impossible to deal with all chronic diseases, but one should remember that a chronic disease makes it difficult for a learner to deal with the normal demands of everyday life. It should be standard procedure to enquire about any disabilities or chronic diseases which learners in a group might be suffering of. One should also enquire about any medication which learners are taking.

Chronic diseases might cause problems if one is doing outdoor activities with a group or if one is taking a group on an excursion. It is advisable to get information about the handling of certain diseases such as epilepsy, diabetes or any other chronic disease because it is important that a teacher or any other person who is handling a group of learners should know how to react swiftly and with confidence. It is important that the person who is handling a group should stay calm and keep the rest of the group calm.

### Slower learners and gifted learners

Slower learners are those learners who learn more slowly or with greater difficulty because their intellectual abilities are below average. Quite often their general development is also slower than learners of the same age. Although they have greater difficulty learning each of these learners is a unique person and should be treated as such.

When dealing with learners who learn slower one can give them the opportunity to work at a slower pace or one can differentiate in the tasks and assignments they are expected to do. They can also get more time to complete certain tasks. One should make sure that one uses language which these learners will understand. It is important that one uses relevant experiences and concrete examples. This can be done in Environmental education because according to Grover et al (1991:4) environmental education programmes must be continuous, must pervade all subject areas at all grade levels and must offer students experiences which are as concrete and direct as possible.

According to the Human Science Research Council giftedness is a special potential that someone has to exploit to an exceptionally high degree in various fields or in only one field. When there is a gifted learner in a group more difficult and challenging work should be given to him or her. Opportunities should be made for this gifted learner to discuss, to debate, to do problem solving and to think and work creatively. Environmental education lends itself to problem solving and creative thinking and acting and this should be exploited to the benefit of gifted learners.

**Learners with behavioural problems**

One should realize that in almost every group of learners which one handles there will be one or more learners with behavioural problems. Managing learners' behaviour in a group is definitely not an easy task. Behavioural problems can range from mild attention seeking to aggressive outbursts and criminality. According to Montgomery disruptive behaviour is "any behaviour which prevents other pupils from learning and causes undue stress to the teacher." The following can be regarded as guidelines to decide whether behaviour is problematic or not:

- The behaviour or the degree of severity is inappropriate to the learner's chronological age group and his or her level of development.
- The behaviour endangers the learner as well as other people.
- The behaviour handicaps the learner by interfering with the learning of new skills or by the exclusion from important learning opportunities.
- The behaviour of the learner could be regarded as contrary to acceptable social norms.

Environmental education often takes place in an informal situation. It is therefore advisable to discuss the behaviour which is expected with the learners beforehand. One should be specific with what behaviour is expected and what is unacceptable. Certain rules could be collaborated with the learners or they could help to draw up a contract. The educator should, however, see to it that the learners adhere to these rules.

Sometimes a learner can be seeking for attention because certain emotional needs of him or her are not fulfilled. By giving this learner resposibility for certain activities in the group, by helping the learner to get the necessary attention from his or her peers or by praising hom or her in the presence of the other learners, this learner might get the attention that he or she is looking for. It is always good to reinforce any good behaviour and to stop and replace negative behaviour by positive, alternative behaviour. When an educator or instructor realises that a learner is becoming restless and therefore the possibility of disruptive behaviour is increasing, this learner should be engaged in an activity which he or she enjoys. The the learner can then be praised for performing the activity well.

Deliberate ignoring of problem behaviour is another technique that could be used. Appropriate behaviour should, however always be praised. If a learner continues to disrupt the group activities, one could remove him of her completely from the group situation for a short period. One should remember that in the end it is the educator who determines the group climate and he or she is the person who is going to reinforce behavioural problems positively or negatively.

One should always be honest with oneself and make sure that the disruptive behaviour of certain learners is not caused by the content which is being dealt with in a group or by the way in which it is presented. Is the content interesting and stimulating for the specific group of learners? Is the way in which the content presented boring? Are there opportunities for the learners to be actively involved and can they use their own creativity?

It can be difficult to distinguish between disruptive behaviour, an abundance of energy and boredom. If one is dealing with a very active and lively group it is always a good idea to give them and especially the young boys the opportunity to get rid of their energy. Give them a chance to run about, to fetch certain specimen outside or to go and observe some objects which are in the distance. One should always make sure that the group knows exactly what behaviour is expected of them and how much time they have at their disposal.

### Learners with language problems

When learners experience problems with language their vocabulary is usually limited, they avoid language communication and they misunderstand instructions, especially long instructions. Their conversations tend to be concrete bound and they would give long descriptions if they cannot remember specific words. Language problems which are present in the mother tongue may be worse in a second language. Many learners who learn through English as a second language experience language problems and they have problems to understand the spoken language as well as expressing themselves.

When dealing with learners who have language problems one should make absolutely sure that the learners understand what is being said. Avoid long sentences and instructions. Try to use as many concrete examples as possible. When dealing with learners who use English as a second language one should try to make use of an interpreter if possible or one should try to have difficult words and concepts translated into the mother tongue of these learners. One should never correct every language mistake which a learner makes because Environmental Education need not be learned in a mistake free language.

### Conclusion

One cannot help but to agree with Robert Filmer who states that Environmental Education can be presented to disabled people any place, any time and any how. I would go further and suggest that it is our duty to present Environmental Education to all learners including those with special educational needs at any place, at any time and in any way.

It has long been held that natural settings and the environment are good for body, mind and soul. John Muir once said in this regard: "Climb the mountains and get their good tidings. Nature's peace will flow into you as sunshine flows into trees. The winds blow their own freshness into you and the storms their energy, while cares drop off like autumn leaves." Help learners with special educational needs to share in and to care for the environment thus giving every person the chance to enjoy the wonderful restoring abilities of the environment.

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# The development of an environmental education research directory for Southern Africa

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## ABSTRACT

Work is well in progress on the development of a directory of all environmental education research completed and in progress in southern Africa. This paper will present a review of what has been completed by the time of the conference as well as the rationale for the design and construction of the directory. Comment from interested parties will be invited.

This paper arises from a programme of research on *research in environmental education* in southern Africa. One of the consequences of the study has been the decision to develop an ***environmental education research directory***, the rationale and provisional structure of which are discussed in the first half of the paper. The second half is a tentative presentation of some of the trends and patterns which have started to emerge from this metaresearch and which will constitute part of the directory. The paper thus represents something of a report in progress. In all respects comment and user-input on the directory and any future updating would be welcome.

A number of arguments may be advanced for a directory of research in environmental education which does not as yet exist in southern Africa. In the first instance, from a user's or potential researcher's perspective, it could provide ready access to what research has been done and how it has been done. It could save enormous time and cost in 'literature searches', thus allowing some intellectual energy and effort to be directed elsewhere in the research process, While most of the material intended for inclusion in the directory is available to researchers through inter-library loan, this is an expensive and time absorbing process better reserved for detailed examination of selected texts. It would also hold the possibility of opening up ideas, opportunities and involvement for further research, providing a basis for both focus and orientation. It may also, dare one say it, encourage a critical and analytical approach to what *has* been done and provide a stimulus to new and innovative work, both conceptually and methodologically. Ultimately, depending upon how such a directory was to be developed, it might provide ready access not only to the ideological, ontological and epistemological assumptions which have underpinned the recorded research, but also to methodological analysis and an assessment of the *effectiveness* of work which has been done.

This leads to a further perspective on the potential value of a directory - as a base point from which to initiate and engage in critical reflection about the ways in which research in environmental education in southern Africa has been conducted and of the kinds of conclusions reached. It may lead to a more detailed perspective of where we have come from, where we are and where we might or even should be going. Much environmental education research done thus far appears *prima facie* to have been either haphazard or random in its choice of subject matter and focus, while any overtly expressed concern to apply the research is hard to find. Patterns of focus are largely absent and collaborative work is the exception. It is possible that a regularly updated directory of existing and current research may also open firmer and more formalised lines of communication between environmental education researchers, supervisors and facilitators than the occasional 'personal communication' and bitty internet and library information upon which we rely at present.

The question inevitably arises as to whether there is really a 'need' for such a directory. While the answer must lie partly in the arguments presented above, future researchers themselves will ultimately make that decision by whether they use it or not. How they use it or what else they might want from it would also determine its future form, content and mode of accessibility. I have certainly been encouraged by both research students and colleagues countrywide that there is a need for such a document. As a relatively 'low cost' research project there is furthermore little risk of 'low return on investment' - in this case overwhelmingly time rather than money.

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The issue arose early on as to what to include in such a directory and inevitably what constituted 'research in environmental education'. Titles of research, while very helpful in identifying the vast majority of environmental education research works, were not entirely reliable both because some titles suggesting an environmental education study were misleading and because other clearly environmental education research did not contain conventional terminology in the title. Thus searches were conducted on all known data bases on 'education' and 'environment' in southern Africa. It is anticipated that as a consequence, relatively little 'environmental education research' would have escaped the net. That some work has, however, there is no doubt. The primary criteria for selection and inclusion were that:

- the work was clearly to have a strong 'environmental' orientation but it was not included if it was concerned with environmental research *per se*, even if there were oblique or incidental references to the educational implications or potential of the study.
- the research should either have a clear focus on educational processes or devote a significant portion of the work to implications for education arising from the study. The ambit of inclusion encompassed formal and non-formal educational enterprise.

Clearly there are occasions when such criteria are not clear cut and decisions had to be taken for inclusion or not.

The proposed ***structure of the directory***, which is already in a relatively advanced stage of preparation, is as follows. There would in the first instance be five sections, currently being worked on as five 'documents'. Document A is a register of all completed master's and doctoral theses and dissertations; Document B contains all known published and unpublished articles and reports; Document C is current (uncompleted) research or research in progress; Document D is a collection of abstracts of theses/dissertations and of published articles; Document E is an overview of environmental education containing material of the kind constituting the latter half of this paper.

It is intended that these documents would all be linked through key words and concepts on a single database, allowing searches in such varied areas as 'site of research' or 'research methods' to be employed. It is envisaged that the first draft directory, including data up to mid-1998, will be available in hard copy, on disc and on the internet in the latter part of this year and that it will be updated on an annual basis.

Of the five documents, Document A is most advanced, work having been completed on 59 of the 82 masters and doctoral theses identified. They span a period of 25 years, from 1972 - 1997. Work completed in 1998 is yet to be added. For each thesis information has, or will be, been extracted to accommodate the following defined fields: author (surname and initials); title; key words; sites (of research); type (master's or doctoral); date (submitted); (where the document is) held at; methods of research (employed); (50 word) summary. This inevitably entails reading substantial portions of each thesis to obtain a clear picture as abstracts or summaries are sometimes not an accurate synopsis of the contents which follow. Some, particularly older theses, do not have an abstract or summary. It is hoped that, once the first draft is available, researchers whose work has been cited and summarised will feel free to comment and suggest any amendments.

Document B at present consists of 54 research or survey based publications using similar fields to those for Document A. A current estimate is that approximately 30 of these publications have flowed from theses, but this is subject to revision. Much work has still to be done both in terms of completing the searches and in extracting the relevant information to cover each field.

Document C is an extension of Documents A and B and universities and research institutes are currently being surveyed in this regard. The progress of Document D parallels that of Documents A and B, while Document E is currently in early draft form.

It is envisaged that once 'completed' these documents might be used as a 'first stage' upon which a more sophisticated review and understanding of research in environmental education in southern Africa could be built. It would be useful for example to subject the body of research as a whole to critical scrutiny and analysis in terms of the varied ideological, ontological and epistemological assumptions made and positions taken, what temporal trends there might be and how assumptions made and positions taken have determined the 'conclusions'. How these considerations relate to or reflect any application of the research and how this was done might be another fertile field of investigation. Such insight would almost certainly provide a focus(es) for future work. Similarly a more elaborate analysis of the geographical sites of the research and the nature of the topics covered might provide better insights into areas of most need and might encourage appropriate funding. Put another way, we do not at this stage have any real idea of the agendas which have driven the environmental education research process nor how much of it has been 'useful', purely esoteric, applied or simply left on the shelves.

The ***trends which are beginning to emerge*** from the work done so far offer a first glimpse of what may be in store and may even provide a starting point for future development of the directory.

The research indicates that environmental education researchers in South Africa are largely educational practitioners in formal and non-formal education. An estimated 30% have a disciplinary base in the natural sciences and 70% in the social sciences, including education, with a small minority having a disciplinary grounding in both. About 65% have some theoretical grounding in 'education' and this proportion is growing. As there are no undergraduate degree courses in environmental education *per se* in southern Africa all researchers have come to the subject from other disciplines and areas of interest. Virtually all research in environmental education has, until now, been conducted on a part-time basis. Only seven of the completed projects are known to have involved fulltime researchers, which is one possible reason for the relative paucity of formal publications emanating from theses.

If theses and published articles are analysed by gender and race, two key transformation issues in South Africa, women are estimated to constitute between 34% and 40% of researchers, while 'black' South Africans at present constitute approximately 24%. Over 90% of the completed research of these two groups has however occurred since 1991, indicating strong upward trends consonant with transformatory ideals. In the period 1991 -1997 women constituted 47% and 'blacks' 35% of completed research output. Preliminary investigations suggest that this may be related to both greater opportunity and an increased perception of the relevance of environmental education.

Prior to 1990, the first year in which a dedicated Masters' programme in environmental education was run in South Africa, there is little evidence of sensitivity to the role which ideology plays in the research process. Researchers in general and certainly in environmental education, tended to accept *their* chosen ideological position as relatively unproblematic. These positions were generally either that of Christian National Education, the dominant and pervasive ideology of the apartheid regime, or a 'liberal-interpretavist' approach.

Subsequent to 1990 changes in research in environmental education were encouraged by a number of factors, chief among which was the emergence of a 'critical mass' in the number of active researchers and research users. Many first-time researchers entering the field were furthermore interested in and influenced by post-positivist paradigms, by the range of methodologies challenging the dominant 'scientific' paradigm and by writers such as Popkewitz in America, and Fien and Robottom in Australia. There were growing concerns that 'traditional' methods and approaches to research, expressed as experimental research, behaviourist assumptions and quantitative analysis, had done little to advance understanding in education and were unlikely to do so in environmental education. Such cherished notions of positivism as 'seeking the truth', 'objectivity', 'measurability', 'control of variables' and the importance of verifiable observation were questioned and then often rejected in part or in total. This different view is still not characteristic of educational research in general in southern Africa, but has at least become more widely considered within environmental education research, thus separating it to a degree both ontologically and methodologically from mainstream educational research.

Such challenges to the assumptions underpinning traditional approaches to research, particularly where human behaviour was concerned, initially took place within the context of non-formal environmental education, which to date and, depending on how one defines that focus, has constituted between 21% and 52% of completed environmental education research. By contrast, such ideas were not always welcomed within the formal education system.

It would be a mistake to assume however that within environmental education there has been a large scale paradigm shift away from positivism. Quite to the contrary, it is estimated that possibly up to 80% of all completed and current research in environmental education is based to some degree upon positivistic assumptions. Of the remainder, possibly half still contain identifiable elements of positivist thinking. Reality appears to be that the 'positivistic' view still offers an attractive comfort zone for researchers, including those who question its fundamental premises. Given the strongly modernistic values of southern African society this is perhaps not surprising, but it has resulted in not a few theses, including doctoral work, presented in recent years displaying considerable tensions and often contradictions between what is *claimed* to be the research paradigm being followed and the methodologies and analyses actually employed. Paradox and dichotomy co-exist, albeit uncomfortably, emphasising the nature of paradigm shift as a process rather than as a clear break with the past.

Methods of data collection have also shown significant changes. While in the nineteen seventies and eighties, document analysis, description and questionnaires tended to dominate, this has been superseded by the use of a wider range of techniques, including questionnaires and interviews used in tandem, workshopping, participant observation and the employment of semi-structured interviews. There is a growing trend towards 'action research' and its associated methodologies while the 'case study' approach in its various guises has also become increasingly popular. Increasing concern with the concept of triangulation is also in evidence.

Environmental education research in southern Africa has been overwhelmingly qualitative in nature, perhaps, in part, as a concrete reflection of widespread concern about the appropriateness, validity and reliability of 'measurement' in understanding education. Much of the work is, however, analytical and evaluative in nature. Predominately theoretical works remain rare, there being possibly only four such examples to date.

The topic orientation of environmental education research provides some insight into where priorities or opportunities have been seen to lie. Until now environmental education research has been approached largely from the direction of 'education' rather than from 'environmental science', although the 'natural environment' has in approximately 24% of cases been the focus of the research. While until the early nineties the *practice* of environmental education was often the expressed concern of 'environmentalists' in Conservation Agencies and NGOs, *research* in environmental education was, paradoxically, most often conducted by practising *social* scientists, such as educationists. The explanation for this may lie in that while natural scientists recognised a need for 'environmental education' (often expressed as an urgent need to transmit correct *information*), they were often poorly equipped to work in a situation where 'the scientific method' was being challenged, and in which they had little practical experience. By way of comparison with the 24% noted above, only 8% of environmental education research has been focused directly on the 'urban environment', 8% on the 'rural' (farm) environment and 10% on the interface between these three categories.

The geographical spread of environmental education research in southern Africa presents another interesting pattern. Approximately 74% of all the research emanates from three of South Africa's 22 universities and two state research agencies. The universities concerned are Rhodes University, University of Cape Town and the University of South Africa. The provinces of South Africa in which the research has been carried out to some extent reflect this configuration although there is not necessarily a direct relationship between the location of the institution and the place where research is conducted. Much of the research located at Rhodes University (in the Eastern Cape province), for example, has been conducted in the Western Cape province.

Three provinces, Eastern Cape (economically the second poorest province), Western Cape (a relatively wealthy province) and KwaZulu-Natal have had 56% of the research done in them. A further 28% of the research has been 'nationally' oriented, while South Africa's other six provinces and two neighbouring states have had only 16% of the research done in them. The relationship between the universities and the sites of research appear not to be random or co-incidental but substantially influenced by the presence of strong conservation agencies and environmentally oriented NGOs, particularly in KwaZulu-Natal and the Western Cape. Possibilities for redressing this apparent imbalance, despite inherent structural difficulties, might conceivably be a consequence flowing from a research directory.

One might tentatively conclude that while environmental education research in South Africa is still on a relatively small scale, it has become an increasingly robust enterprise pushing new ideological, epistemological and methodological frontiers. In general however, it needs to be more widely published and the opportunities for accessibility more vigorously pursued. Many of the problematic patterns brought into relief by this brief analysis furthermore provide opportunities for both enriching the environmental education research process and developing new ideas and approaches. To a large extent research has been both a reflection and a shaping of wider environmental education practices. The way in which a directory of environmental education research might influence this remains to be seen.

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# Native African tribes and the African environment

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## 1 INTRODUCTION:

Examples of the art, the habits, folk-tales and myths of various ancient African natives tribes will be provided and discussed to show how well these peoples knew their environment and how closely they lived in relation with it. For various reasons they were sometimes also detrimental to their environment. The hunter-gatherer way of life, which evolved into close ecological harmony with its natural environment, has great relevance for us in a rapidly 'developing' world which so often abuses the environment *[Maggs (ed.) 1986: 8]*.

## 2 ART:

Special attention will be given to the rock art of the Bushmen (San). They were Later Stone Age people. The delicate features of their paintings and the sure, economical lines of their engravings are breathtaking. Simply looking at the art gives a great deal of pleasure. When looking at a polychrome painting of an eland, for instance, one should note small details such as the tuft of red hair on its forehead, the black line along its back, the darkening of the snout, the cloven hoofs, and way in which the shading moulds the contours of the body. As many writers have remarked, the San were keen observers of the world around them. *[Lewis-Williams 1990: 12 & 13]*

The materials for performing their art came from the environment. Feathers fixed into the ends of tiny reeds were used as brushes. Their paints consisted of: black - charcoal mixed with water; white - powdered clay mixed with a plant juice; red - haematite (very meticulously prepared) was mixed with the blood of a freshly killed eland. *[Lewis-Williams 1983: 25]*

The men concerned themselves principally with hunting animals and the women with gathering plant foods. Both these activities appear in their art. *[Lewis-Williams 1990: 23]* Many of the rock paintings show evidence of how extremely observant they were. They looked around them and painted the animals that they saw. *[Woodhouse 1984: 3]* Paintings of the eland, the largest African antelope, greatly outnumber those of any other animals depicted *[Woodhouse 1984: 33]*. The eland was of great significance to the Bushmen. The Eland Bull Dance will be explained under rituals. A San boy was considered a man when he had killed his first large antelope, preferably an eland. The killing of an eland was an important event because it brought together many people. It symbolised social relationships and the unity of the people. During marriage rituals the bride was anointed with eland fat. The San considered the eland to have more supernatural potency than any other animal, and the shamans (ritual specialists) liked to 'dance eland power'. As they did so, they blended with the eland, a hallucinatory experience often depicted in the art. Clearly, the eland symbol reached into many parts of Busman thought and ritual. A rock painting of an eland thus triggered more and very different meanings in the Bushman mind than it does in a modern Western mind. *[Lewis-Williams 1990: 76-79]*

The zigzag patterns, which are also found in their art, seems to be connected to the religious life of the Bushmen, explicitly in the context of their trance dance and resulting trance experiences. The trance dance was performed as a healing ritual and it involved the entire community. This dance is the Bushmen's most important religious ritual. An understanding of its purpose and various features are essential to a proper appreciation of their rock art. Recent research has shown that the trance dance and the spiritual experiences of shamans lie at the heart of San rock art. The art depicts the visions and experiences of shamans who entered trance. *[Lewis-Williams 1990: 44 & 55]*. Shamans/medical men played a significant role in Bushman life. A shaman is a ritual specialist who goes into a state of altered consciousness (generally known as trance) in order to heal people. They also believed that the shamans could make rain and guide antelope herds into the hunters' ambush. *[Lewis-Williams 1990: 28]* The Bushmen rock art was not a mere daubing of figures for idle pastime. On the contrary, it had a 'spiritual character' and was part of their religion.

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*The art of the Ndebele people*: The elaborate traditional dress and the striking wall paintings, made by the Ndebele women, became an integral part of their environment. Their eye-catching homesteads were decorated with materials taken directly from the landscape. In line with the women's role of keeping the home in repair, it was also part of the Ndebele girl's informal education, during her initiation, to learn to decorate walls. Ndebele women indicated that homestead decoration 'shows who we are' and 'learning to paint is equivalent to going to school today'. They utilised local earth colours for pigment. If a particular unusual clay was discovered, it was not uncommon for a woman to walk for several hours to get it from the deposits for her decorations. *[Nettleton & Hammond-Tooke 1989: 117-118]*

## 3 HABITS:

Not all habits were in harmony with the environment. Some opposed wild-life conservation, as Lichtenstein mentioned in his early eighteenth century report on the Bushmen: "Everything that they themselves cannot use on the spot is being destroyed to prevent everybody else from utilising it."

Interesting customs include the importance of the initiation ceremonies for both young men and young women. In many African societies female puberty was characterised by ritual. The Bushman dance, called the eland dance, was danced only at the puberty ceremony of a girl, and then only by the women. While performing the dance they lifted their karosses or aprons and bared their buttocks which they waggled provocatively from side to side. The dance was intended to summon up the eland bull which may be simulated by one or two of the old men wearing horns on their heads and hunching under their karosses. A painting in the Drakensberg records the dance around the shelter where the young girl is secluded. *[Woodhouse 1984: 34]* Like womanhood, manhood was attained with age and by undergoing the appropriate ritual. In the case of males it usually involves the ordeal of circumcision. *[Sichone 1994: 13]*

The *lobolo* custom (paying the bride's family in cattle) is central to marriage in Zulu culture. The loss of a member disturbs the equilibrium between the two groups, and this has to be set right by the giving in return of something else of great value in the lives of the people. Hence *lobolo* or passing of cattle from the group of the boy to that of the girl. *Lobolo* validates/legalizes/legitimates a marriage. It is paid as compensation of some sort to the family of the bride. It plays a symbolic role in creating and maintaining relationships across society. Marriage, in traditional Zulu life, has none of the courtship of European folk-tales, but is the realisation that a wife must be worked for. *Lobolo* is the sign of the man's willingness and ability to provide for the family. The Zulu proverb: "I got her *lobolo* with hardship" is an apt description of the husband's test that must be achieved before he is eligible for marriage. The Zulus believe that one does not value that which is obtained too easily. This sacrifice is a test which must be accomplished before a party qualifies for marriage. *[Pottow n.d.: 79-80]*

Beer drinking was the most characteristic custom of the Thembu tribal life. It was used on almost every occasion for it fulfilled the needs of food and celebration. Beer was served at all important ceremonies such as sacrifices (to propitiate the ancestral spirits), marriage festivities, funeral rites, dances, feasts and ordinary parties known as 'beer drinks'. The making of beer required elaborate preparation. Every home possessed a wooden beer barrel, a large oval hollowed-out stone and one or more smooth rounded stones that are used as grinders. The Tembu brewed their beer from mealies (corn) and called it *u-tywala*. In most homes one barrel of beer was made at a time. On Tuesday the mealies were grounded, the meal falling on to a thick grass mat - *isithebe* - and then it was poured into the barrel. The woman added two buckets of lukewarm water, stirred well and covered the barrel with a grass mat. The following morning the water was drained off and put aside. The softened meal was reground, placed in the barrel with two buckets of boiling water and stirred. After an hour the first water was added, the barrel topped up and a bucketful of sprouted sorghum was mixed in. Early next morning the housewife had put five large pots on the open fire and into each poured a litre of this mixture. She stirred constantly and, as soon as it boiled, she added another litre. As soon as one pot boiled it was removed from the fire. The mixture cooked into a thick sour gruel. The entire contents of the barrel were cooked and then cooled. In the afternoon the cooled gruel were poured into the barrel and a small dish of finely-ground sprouted sorghum was stirred in and the mixture was left to ferment for twenty-four hours. On Friday the beer was strained into basins. When the strained beer was returned to the barrel 180 litres of light-coloured, very nutritious ale awaited consumption. *[Broster 1976: 81-82]*

## 4 FOLK-TALES:

It is said that one has never known real, earthy, satisfying drama, the kind that gets into the blood and stays there, until one has experienced the storytelling marathons of the African tribes people. These folk-tales have been handed down from generation to generation. The 'animal trickster' protagonists in these stories varied with the fauna of the area in which they are found *[Spears 1991: x]*. The following are examples of African folk-tales:

How the ostrich got his long neck (Kikuyu): Mr. Ostrich was a sober-minded, serious husband, who was always willing to assist his wife in her family duties. He said to her one evening, when their large clutch of eggs seemed almost ready to hatch, "my black feathers cannot be seen in the darkness, *I* will guard our eggs by night and keep them warm. You can relax and enjoy yourself until daybreak." They had decided to rear their young on the short-grassed plainlands because they could see all around them. In those days the ostrich had a short neck like a partridge. On the whole the two of them were a happy pair - although the husband sometimes disapproved of his wife's high-spirited ways. It was full moon. While attending the eggs, mr. Ostrich's head was beginning to nod with weariness. He became aware of his wife's hissing laugh. He was wide awake immediately. Straining his short neck to its utmost, he saw her dodging between the termite-mounds in a game of hide-and-seek with a handsome young ostrich in hot pursuit. He dare not leave the precious eggs, whatever the reason. He settled with a feeling of annoyance, but strained his neck further and further, to catch sight of her as she raced between the termite-mounds in the moonlight. Sometimes he did catch a glimpse of her and heard her foolish giggles. Each time he strained and stretched his neck. At last the night was over. He rose stiffly and realised with a shock that his neck had stretched beyond return. And that is why the ostrich has a long neck - a lasting memory of a flighty wife. *[Savory 1993: 51-52]*

How the Zebra got its stripes and why Baboons dwell among the rocks (Bushmen): Zebra fought with Baboon for access to a waterhole. During the struggle Zebra fell into Baboon's fire which was burning close by. This had two effects. The first was to pain Zebra into renewed vigour so that it threw Baboon up into the top of a nearby hill, where it has remained ever since. The second effect was to burn the stripes into the skin of Zebra. *[Woodhouse 1984: 117]*

The beauty of the partridge (Algeria): A partridge rolled about a forest floor until its feathers took on a beautiful sheen. It climb halfway up a mountain and beat its beak against a rock until it became a glowing red hue. Then it climb to the top of the mountain and stared at the sky until its eyes became blue. The partridge came down and it met a donkey, who said, "You are so beautiful, you must ride on my back." The partridge rode on the donkey's back across a plain. They met a Jackal, who asked, "How did you become so beautiful?" The partridge said, "I rolled on the forest floor, I beat my beak against a rock, and I stared into the sky." The jackal set off to do the same. It rolled on the forrest floor, and its hair fell out. It beat its nose against a rock, and broke its teeth. It climb to the top of a mountain and stared at the sky, and became blind. It tripped, coming down the mountain, and plunged over a precipice. Its entrails fell out. *[Scheub 1990: 212]*

The origin of death (Hottentot): The Moon once sent an insect to men to tell them: "As I die, and dying live; so you shall also die, and dying live." While on his way, the insect was overtaken by the hare, who asked, "On what errand are you bound?" The insect answered, "The Moon sent me to tell men that as he dies and dying lives, so shall they also die and dying live." The hare said, "I am a better runner, I'll go." When the hare reached men, he said, "I am sent by the Moon to tell you, 'As I die and dying perish, in the same manner you also shall die and come wholly to an end.'" When the hare returned to the Moon, the Moon reproached him angrily, saying, "Do you dare tell the people a thing which I have not said?" The Moon took up a piece of wood and struck the hare on the nose. Since that day the hare's nose has a slit, but men believe what Hare had told them. *[Radin (ed.) 1952: 63]*

Sometimes too much wisdom hurts (Nigeria): Ilechi was travelling across the Ibamba River with a group of traders. Suddenly his donkey slipped on the narrow wooden bridge and fell into the river. The river was not very deep, hence the donkey did not drown, but the donkey noticed that his burden of salt was made extremely lighter. Ilechi returned to the market and purchased another bag of salt. On reaching the bridge, the donkey knowingly stumbled and fell into the river. Braying triumphantly, he realized his load was gone. On his third trip, Ilechi purchased a bag of sponge, instead of salt, but this was not known to the donkey. When he got to the bridge and fell into the river, he found that his load, instead of getting lighter, was three times heavier. It was now Ilechi's turn to laugh! *[Dada 1970: 22]*

The horned viper and the birds (Sierra Leone): A horned viper was attacked by red ants and could not get rid of them. It fled, crossed a river and then it made its home at the bottom of a large tree. This tree bore many berries much loved by birds. They picked them and perched on the branches to eat them. They did not eat the pips or the skins. They let these fall to the ground. The pips and skins made a horrible mess at the bottom of the tree. This annoyed the horned viper. When it first made its home by the tree, the birds would greet the viper everyday and they became very friendly. One little bird used to talk to the viper more than the others. One day the viper told the bird of the mess he and his friends were making round his house. They must stop it, and go eat their food elsewhere. The bird opened its mouth to reply and dropped some skin right on top of the viper. This angered the viper so much that it spat some of its poison at the bird, which blinded him temporarily. He got better and was preparing to fly away when the viper spoke to him. "Although you are my friend I spat poison in your eye, but I could easily have killed you. Go, tell all your friends that if they make this mess again I will kill them." The birds paid no attention and continued to drop the pips and skins on the snake. So it killed them with its poison. "You should learn to listen when you are warned," it said. *[Yassin 1967: 39-40]*

The lion's advice (West Africa): Two friends, Kwasi and Kwaku, one day went to the bush. They had been playing there when they saw a lion coming. Kwasi climbed a tree, but Kwaku couldn't climb so well, and had to stay behind on the ground. He was very frightened and called up to his friend, "Kwasi, what shall I do?" Kwasi said, "You must look for yourself." Kwaku had heard somewhere that a lion doesn't eat dead meat, so he lay down and feigned death. The lion came up to him and sniffed at him and then went off. Kwasi came down from the tree and said to Kwaku, "I thought you were dead. What was the lion saying to you?" Kwaku told Kwasi, "He said a lot of things to me, but the most important one was that I should choose my friends better. So when we leave here, you and I will part company for good." *[Spears (ed.) 1991: 144]*

*The Guinea Fowl, the Jackal and the Vulture* (Hausa): Jackal came to Guinea Fowl while laying eggs. He said, "Arutu-tu-tu." She gave him an egg and he ate it. Guinea Fowl laid many eggs, but because she kept giving them to Jackal she never had any children. One day Vulture was flying overhead and asked, "Guinea Fowl, where are all your children?" She replied that Jackal had eaten all her eggs. Vulture said, "Next time tell him to climb the tree and get an egg himself." When Jackal came again Guinea Fowl told him as she was advised. Jackal tried to climb the tree, but fell down. Jackal tricked her out of her eggs for a long time, but Vulture taught her some trickery to prevent him from eating her eggs. Jackal asked Guinea Fowl the origin of her cleverness. Guinea Fowl said, "I refuse, I'm not going to tell you it was Vulture." Jackal now realised it was Vulture. Jackal then went to the garbage heap and pretend to be dead. Vulture came pass and, thinking he was dead, she landed on his mouth and pushed on it to be sure he was not alive. Jackal quickly caught Vulture and told her, "Carry me to the market in the sky, or be eaten." Vulture replied, "I'll carry you to the market in the sky. If we pass the small market and someone shouts, 'There's Jackal and Vulture,' be silent. If we pass the large market, and someone shouts the same, tell them it's none of your business." Over the small market someone shouted, but Jackal kept silent. Over the large market Jackal said, "It's none of your ...", and he fell into the area where the butchers were butchering some animals. They grabbed him and beat him. That is the reason you do not find Jackal, Vulture and Guinea Fowl in the same place. *[Glew & Babal 1993: 11-12]*

## 5 MYTHS:

In 1857 a catastrophe befell the Xhosa people. A young girl, Nongqause, told the people that the ancestral spirits had spoken to her at the river. Her uncle, Mhlakaza, was a famous witch-doctor amongst the Xhosa and people streamed to his village to hear Nongqause's message, which was to the effect that the Xhosa should kill all their cattle and destroy their maize. On a given day a blood-red sun would rise out of the sea and return to the east, the dead would rise, the aged would become young again; thousands of soldiers would rise from the earth. The white people would then be driven into the sea, fat cattle would fill the pens and the granaries would fill up automatically! When Commissioner Charles Brownlee heard of this rumour circulating amongst the Xhosa, he spent weeks in the saddle warning the people that Nongqause's prophecy would never be fulfilled in eternity. This resulted in the Xhosas naming him Naphakade (Even in eternity), but they paid no heed to his warnings and persisted in their butchery and destruction. When the awaited day arrived, the sun rose as always and set in the

West. Nothing happened. Death from starvation awaited a bewildered people. Thousands of them perished and it was only the food and assistance given by the Whites that saved the Xhosas from nearly total extinction. The territory between the Keiskamma and Kei, practically depopulated after this catastrophe. *[Oosthuysen et al. n.d.: 16]*

"Rainmaking" was practised by the Bushmen/San. They conceived of the rain as an animal of indeterminate species and spoke of its legs, hair, tail, blood and milk. By 'rain's people' those shamans is meant who specialised in rain-making and protecting people from thunderstorms. When they wished to make rain, the shamans of the rain went into the spirit world of trance where they captured a hallucinatory rain animal or 'rain-cow', led it across the veld and then killed it so that its blood and milk would fall as rain. In San thought, snakes are also closely associated with rain and water; like swallows, they are said to be 'the rain things'. The link between eland and rain can be clearly seen in a myth in which an eland is killed and its meat becomes rain, in the same way that a rain-animal is killed and becomes rain. *[Lewis-Williams 1990: 46,47,51 & 78]*

The bisexuality of many Dogon bronze figurines is explained by the Dogon myth of creation. The Dogon people of Mali believed that the creator god Amma, at a second attempt at intercourse with the world (the first having produced a jackal) succeeded in his aim and gave birth to the celestial twins, the Nommo. These were hermaphrodites who together produced four further sets of twins, the eight ancestors of the Dogon race. The Dogan believe that every child is born both male and female, the foreskin being the sign of the feminine in boys, the clitoris that of the masculine in girls. Only at puberty, after circumcision or excision, does the child become a full member of society, having rid himself of the dual sex nature. *[Fisher 1987: 107 &109]*

## 6 CONCLUSION:

Told stories and painted compositions have a strong sense-and-consensus-making value: a positive ambience concerning all aspects of the 'social' business of hunting game with primitive weapons, gathering wild vegetable foods and sharing commodities in defined ways is established. The folk-tales, rock art and habits codify positive attitudes toward the precise social arrangements through which the ancient African tribal people had to co-operate to ensure sufficient resources to sustain their generation and to perpetuate their societies as entities in themselves. The conservation of human resources is as important as the preservation and conservation of human culture. The more sophisticated the culture, the more it becomes evident that it is heredity and environment that make the difference.

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## Wild, Wonderful Wyoming:Choices for the Future

*David Rizor and Duane Keown*

One of the most pressing needs in today's world is wise decision making on issues concerning the environment. The best insurance for good decision making is good education about the environment. This needs to be done not in a piecemeal or fragmented approach, but rather in a comprehensive program which exposes students to the interrelatedness of all parts of the environment: biotic, abiotic, human and non-human. Issues related to the environment and natural resources dominate both the electronic and print media in Wyoming and the West, with special interest groups constantly lobbying for their point of view. This makes it imperative for our decision makers as well as the general public to be well prepared to make decisions which will have long term implications on the environment and our quality of life. In fact, when the Wyoming Game & Fish Department held a series of community meetings throughout the state (Wildlife 201 0) asking for public input on what action that department should take as they look ahead toward the year 2010, the overwhelming response was a call for more environmental education.

There are many fine programs available today in environmental education, but most address only limited pieces of the environment such as wildlife, water, energy, or forests. They do not present a comprehensive view of the environment, and most are not being disseminated in a way that produces the largest impact in reaching our future decision makers. Some of the fine programs presently available are Project Wild which focuses primarily on wildlife, Project Learning Tree which focuses primarily on forests, Project WET which focuses primarily on water, and so on. The need exists for a holistic program which ties together these individual programs which center around specific pieces of the environment because, after all, the parts of the environment are inextricably inter-related and must be considered in the context of the larger whole. This is where the *Wild, Wonderful, Wyoming: Choices for the Future* curriculum fits in.

### The Statewide Integrated Conservation Education Program

The Wyoming Conservation Connection, a unique unit of the Natural Science Program at the University of Wyoming, began in 1987 by offering Project Learning Tree Workshops for teachers. By 1994 workshops for several specific areas of natural resource conservation education were, and still are, being offered. Project Learning Tree continues to be popular along with the Energy & Recycling Curricula Workshops and Water Conservation Curricula Workshops (both curricula were developed at the Conservation Connection), as well as Population Education and others. In the summers, the Conservation Connections three and four day Natural Science Workshops for teachers provided a means to witness the powerful learning opportunity provided by a more comprehensive program. These workshops include many individual pieces with limited focus which are joined together in the more complete context of environmental education, stewardship of natural resources and their sustainability, and a long range vision for quality of life. The Statewide Integrated Conservation Education Program (SICEP) is the natural outgrowth of these workshops.

With a continuing grant from Eisenhower Math and Science Improvement Funds, the curriculum materials of the SICEP program, named *Wild Wonderful Wyoming: Choices for the Future*, integrates conservation concepts into all subjects of our schools in grades K-12. *Wild Wonderful Wyoming* is not another class being added to an already bulging school curriculum. The design of the Wild Wonderful Wyoming materials is intended to incorporate concepts about sustaining the environment and our high quality of life into the school curriculums that are already in place.

As the name implies, *Wild Wonderful Wyoming: Choices for the Future* is designed to give K-12 students the background needed to make important decisions about the future. Although "Wyoming" is included in the name because the project began with more localized funding, the program is truly a model for the West and the scientifically-based concepts which are included in each lesson are applicable anywhere in the world. This program was put together not by a company hoping to make money or by a group pushing a slanted agenda, but by outstanding professional educators who have taken this opportunity to put together activities from various sources such as those mentioned above to make one outstanding comprehensive program. The elementary manual has 77 activities drawn from 27 sources which have been modified to reflect the most effective pedagogical methods by people who

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understand how children learn. This allows the best ideas and activities from many outstanding sources to be put together and modified into one logical, comprehensive program.

One of the less visible features of this program that sets it apart from others is the dissemination method. Most current programs are offered to teachers as weekend workshops or after school workshops. This generally attracts those already teaching the subject because they are interested enough to make the extra effort to attend. This program has used a different approach by "networking" with school districts. School districts have "bought in" to the program by choosing the teachers who have helped put the program together. As a result, whole-school workshops are offered as inservice in these districts on a program one or more of their teachers has helped develop. By approaching the workshops in this way they don't have to be offered at inconvenient times and will include all teachers in the school, not just those who are already interested. Most teachers who would not have otherwise attended are pleasantly surprised and eager to try the activities.

*Wild. Wonderful Wyoming: Choices for the Future* is not designed to be an added-on class to a school curriculum which is probably already full. Rather, the lessons are designed to be "integratable" - that is, easily used within the current curriculum framework. After all, environmental education is a large umbrella containing virtually all subject areas from science to history, political science to art, and from language arts to music.

Most of the states forty-nine school districts have joined SICEP. Each of these districts superintendent has selected one or more outstanding teachers from the district to serve as that districts teacher-facilitator. In some cases the teacher-facilitators were selected through a recommendation process and in other cases selection was through a competitive interview screening. Each of these teachers not only has an interest in environmental education, they are also among the very best educators in the state. The teacher-facilitators are at the heart of the project, writing and OJ compiling curriculum activities that will go into each of the large activity manuals written for both the elementary grades and the secondary level. By establishing ties to the school at the very beginning of this project, the materials already possess an avenue into the classroom. Not only is this a teacher-originated product but the project began with the endorsement of superintendents in the individual school districts. Now that it is time for implementation through school workshops, the power of this model is being realized through preestablished school district support.

The model being used in developing *Wild, Wonderful Wyoming* is aimed at creating a product that is not only factually and pedagogically correct, but also to produce attractive manuals that teachers will want to use and find easy to use. This model, in short, is to provide a sound framework in which exemplary teachers can work to produce an outstanding product in terms of both content and usability. No one understands better what teachers need than teachers do, so it makes sense to let teachers have the majority of input in creating "teacher friendly" materials. Since these manuals are being produced with usability in mind, the teacher-facilitators not only write and compile activities, but also recommend manual designs, page layouts, charts, pictures, titles, graphics, and other information that will enhance "teacher friendliness" in the finished product. With the professional expertise provided by the Bureau of Land Management (BLM), and nearly a hundred color photographs from the Wyoming Game & Fish Department *(Wyoming Wildlife Magazine)* and others, the attractiveness and teacher-friendliness is superb. And who will be better qualified to teach teachers how to use the manuals than the teachers who helped produce them?

### Curriculum Structure

The framework for the curriculum was built using several environmental education reference documents and materials, as well as materials developed in SICEP. The basic wording of the goals was drawn from *Learner Outcomes for Environmental Literacy* (Wyoming Environmental Education Task Force, 199 1), and the *Comprehensive Plan for Environmental Education* (Governors Task Force on Environmental Education 1992):

Goals of the SICEP are to realize a Wyoming High School Graduate who:

**Goal A**

Has a working knowledge of those cross-disciplinary concepts pertaining to the sustainable use of an environment hospitable to the diversity of Earths species, including man.

**Goal B**

Seeks to expand direct human experience with the natural world to satisfy curiosity about how things work.

**Goal C**

Understands and values natural systems; comprehends that all life is connected and that before any part of an ecosystem is changed, the impact of the change on the ecosystem and the biosphere must be considered.

**Goal D**

Thinks critically about environmental issues, communicates effectively about them, and is motivated to help resolve them.

**Goal E**

Is committed to the continuing development and application of a sustainable land ethic.

**Goal F**

Will understand what natural resources management is, how and why humans manage natural resources and how **this** management affects humans. Students will further understand that management decisions are based on human-defined goals, values and needs.

To complete the framework, appropriate concepts were either written or chosen from references such as *Essential Learnings in Environmental Education* (NAEE, Ballard & Pandya 1990), and listed under each of the goal statements.

Working within this framework, the teacher-facilitators have developed activities during a series of three two week summer workshops. Then, during the school year, they have used the activities in their classrooms to evaluate them. Many of the activities are being borrowed from other excellent programs such as *Project Wild, Project Learning Tree, and OBIS,* but the finished product will be much more comprehensive than any of these programs are individually. In fact, nearly 30 sources are used in the elementary manual alone. Rather than focusing on wildlife, trees, nature awareness or any other single perspective, *Wild Wonderful Wyoming* takes a complete environmental education approach utilizing the best of other programs as well as including new activities. If not already written to incorporate current pedagogical techniques, these activities are modified into formats that center around discovery beaming, the beaming cycle, and cooperative beaming when appropriate:

| | |
|---|---|
| **Earth Systems**: | Looks at the dynamic cycles and systems on earth |
| **Water Resources**: | Water is vital to all living things, and is especially precious in the and west. |
| **Energy Minerals & Recycling**: | .We depend on an abundant energy supply and Wyoming is a major energy supplier. Sustainable energy is explored. Recycling is vital to conserve energy, raw materials, and landfill spice. |
| **Wildlife Resources**: | Wildlife are an important economic, biological and quality of life resource |
| **Forest Resources**: | .Forests are also an important resource for our economy, biological health, and quality of life. |
| **Agriculture Resources**: | Agricultural depends on a healthy environment and society depends on agriculture |

Five common themes tie these topic areas together. Within each chapter these five strands - Earth Time, Geology-Geophysical, Ecosystem Functions, Evolution-Adaptation, and Population - help maintain the continuity and interconnected structure of the activities. These five strand names each hint at a connection to science. This is no accident. All activities in the book have been centered around sound scientific concepts and are reviewed to insure their accuracy and academic objectivity. Education, especially that which examines long-term effects of important public policy and personal lifestyle choices is not the proper forum for emotionally charged material. Therefore, all of the activities, whether they are primarily science activities or in another area such as history, language arts, or art, are based on fact and sound scientific reasoning.

To insure the integrity of the material for content, educational appropriateness, and objective analysis of issues, the project is being overseen by a 18 member review board composed of members of industry, school board members, scientists, resource managers, and educators.

**Not Just Science**

One of the exciting aspects of environmental education that allows it to be easily integrated into an existing curriculum is its diverse nature. Virtually every subject area is included under the umbrella of environmental education: science, to understand the relationships between and among living things and the physical earth; economics and health, for we will always depend on the resources of the earth for food and raw materials; language arts to communicate our ideas in language; art, music, dance, and theatre to communicate ideas in other ways; history, to examine what has and hasn't worked in the past; sociology; political science; and so on are all important in helping students develop into wise decision makers.

**Not Just for Kids**

The *Wild Wonderful Wyoming: Choices for the Future* manuals are not just a collection of outstanding activities for teachers to do with their students. The books are designed to help the teacher become better educated in environmental concepts as well. Each chapter begins with an essay which describes the concept and some of the issues involved with that resource area, as well as orienting the teacher to where the activities fit into the topic area. Also, each activity has a short 8 background piece to help further acquaint teachers with how the lesson fits into the larger picture of the environment.

Status

The Elementary Manual has been completed with the Secondary manual now in the editing phase. They are distributed to Wyoming teachers through a series of "how to" workshops held at schools throughout the state. The teachers who help write and compile the manuals are the representatives for the program in their district. As the environmental education leaders in their district, these teachers help with the instruction at workshops, with University faculty and resource specialists. These SICEP representatives are a valuable link for their district between programs, resource agencies, the University, and their districts teachers. There are nearly 4000 elementary teachers and 3000 secondary teachers in Wyoming, and the plan for SICEP includes involving each of them in this program, giving each teacher a SICEP manual and the training to use it effectively in their classroom. Currently 1000 elementary teachers have attended workshops and have the manuals. Workshops for the secondary teachers are planned to begin in the fall of 1998.

The activity producing segment of the project is not at an end. The manuals are being produced in a three-ring binder format, with each chapter individually numbered to easily allow the addition of new pages which will be sent to teachers who already have their manual. SICEP teachers will continue to meet each summer to add new activities and update old ones, as well as participate in seminars and activities for their own professional development.

**Summer Natural Science Workshops for Teachers**

Each summer since 1987 the Wyoming Conservation Connection has offered natural science workshops for teachers. With the implementation of *Wild, Wonderful Wyoming.. Choices for the Future*, these workshops will be the perfect extension for teachers who have attended an implementation workshop and would like to broaden their knowledge about the environment and expand their environmental education skills. The workshops are offered in "nature camp" type settings with a variety of session taught over a three to four day period by university faculty and staff, resource agency specialists, K-12 teachers, and other EE experts.

**Broad-based Coalition of Financial Support**

Rather than rely on one large government grant which, given current "belt tightening" in both federal and state governments, may be tenuous in its duration, the program has been establishing ties to form a broad spectrum of smaller supporters. Examples of supporters include business organizations involved with resources use, resource management agencies, and school districts. By not asking any one donor for a large amount and relying on many small donors, the program is gaining a stability and outlook for long range effectiveness that would not otherwise be possible.

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## Population education for the global family

*Cyprian Othieno K'oywa*
*Sonbo, Kenya*

### INTRODUCTION

Next year, 1999, will mark a milestone in world demographics, the sixth billionth person will join the global family. This is twice the population of 1960 or 38 years ago.

The rapid and recent growth in the size of our global family is intricately linked to many of the environmental and social trends of our present society: strains on our natural resources, diminishing open space for wildlife habitat and recreation, polluted air and water, climate change, unprecedented worldwide communication and trade, an increase of people living in poverty and great migrations of people within and between countries.

In response to these trends, people are asking themselves:

- What do we want our future to be like?
- What do we want our communities to look like?
- How do we provide for the best quality of life for present and future generations?

At the core of these questions is the concept of SUSTAINABILITY — providing for people's present needs while not compromising the ability of future generations to meet their needs. Helping humankind to thrive in the 21st Century requires that we recognize the importance of living in balance with our physical environment and treating each other with dignity and equity.

### OBJECTIVES OF THE WORKSHOP ACTIVITIES

Today's students will be tomorrow's leaders, parents and professionals. Their decisions as young people and adults form the environmental and social trends that shape our society.

The hands-on or minds-on activities that will follow in this presentation are designed to broaden their knowledge of rends and connections between population change, natural resource use, global economics, gender equity and community health. This knowledge, combined with the critical thinking skills developed in each activity will help students explore their roles as global citizens and environmental stewards.

Population dynamics are behind many of today's headlines: housing and water shortages, pollution, unemployment, foreign aid programs and debates over local growth and development. By using population studies as a focus, teachers can help their students understand many current issues. The value-neutral activities of this presentation are useful for teachers to present population concepts and trends in a way that helps students understand this information and apply it to their own experience.

### ACTIVITIES

1. **The apple of our eye** [5 minutes]

   A demonstration in which the instructor uses an apple to represent the earth. The instructor cuts off fractions of the apple to represent areas of the earth that people cannot use to grow food: water, wasteland, developed land, etc. Students gain a better understanding of the small size of arable land area that is available to us.

   Material: apple, knife and napkin

2. **Stork and grim reaper** [5 minutes]

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The carrying capacity of a future planet is demonstrated as the stork, with a large cup and grim reaper with a small cup. Alternatively add and subtract water (representing people from a bowl [earth])

Materials:
- Stork and grim reaper cards with pin
- large clear bowl
- another bowl or pitcher (opaque)
- 2 dippers (measuring cups of different sizes, ideally one cup should be 3 times the size of another cup)
- Food colouring

3. **Bacteria bottle** [5 minutes]

A riddle which illustrates the concept of exponential growth with a story of bacteria multiplying by division in a laboratory bottle.

Materials: Answer sheets (provided by the presenter)

4. **Timber** [5 minutes]

In this role playing stimulation, students observe what happens to a forest when the demand for wood is greater than the supply. With continued population growth and inadequate planning, renewable resources such as trees are often used faster than they can be replaced.

Materials:
- 120 craft sticks in a can with a rubber band around them for each group of 4 students
- 32 craft sticks in a rubber band (for each group)
- stop watch
- 4 cards marked: lumberjack, forest, manager, timer

5. **Population riddles** [5 minutes]

A series of riddles designed to help students understand the concept of exponential growth and appreciate the size of large numbers (millions and billion) by relating these numbers to common life experiences.

Materials: Answer sheets (to be distributed by the presenter)

6. **Hunger banquet** [20 minutes]

Much of the world suffers from chronic hunger and malnutrition due to population pressures and the inequitable distribution of food and wealth. This luncheon game is meant to simulate for students some of the inequities of the present socio-economic world situation and some of the feelings of helplessness and frustration that result from these inequities. By enabling the participants to deal with a concrete experience of purchasing power, the exercise becomes a learning tool that explores global imbalances. Through this luncheon, the students will become more familiar with the disparity of resources around the world and may then make the links to the disparity of resources in their own countries.

Materials:
- Food (see menu for items needed): Larger quantities for the cheaper items will be needed since most students will only be able to afford those
- 3 tables (one buffet style for food, two for eating)
- 1 table cloth and table furnishings (center piece, etc.)
- 10 chairs
- 200 'chips' (small squares of cut paper)

- 30 half 'chips' (small squares of different colour cut paper)
- 15 visas (small cards marked 'VISA')
- 4 industrial First World Role Identity Cards
- 3 Transitional Second World Role Identity Cards
- 23 developing / Third World Role Identity Cards
- 30 menus (or one large menu posted for the groups)

7. **Video: World Population** [10 minutes]

A six minute film which depicts population growth from the year 1 AD through the year 2020. During the film white dots, each representing 1 million persons, appear on a map of the world as a timeline depicts passage through history.

Material: Video tape, player and colored screen.

8. **Discussions and comments by the participants** [ 15 minutes]

## CONCLUSION

ZPG has developed several teaching kits relevant for primary and secondary levels and a number of other resources.

ZPG welcomes invitations to offer in-service programs in school districts at all places.

Participants are all welcome to become ZPG Population Education Trainers: Write 'PETNET' next to your names on the sheets if you are interested in being contacted about joining the trainers network.

## EVALUATION

Evaluation forms will be distributed to the participants to be anonymously filled out and handed back to the presenter.

## SUMMARY OF ACTIVITIES

*Presenter:*
C.O. K'Oywa, SONBO, Kenya

*Best of Both Worlds International Conference*
South Africa

| | ACTIVITIES | DESCRIPTION | SUBJECTS | SKILLS | TIME |
|---|---|---|---|---|---|
| | Introduction | Introduction of Presenter and ZPG | Language Arts | Understanding Pop. Ed. Concepts | 10 min |
| 1. | Apple of your eye | A dramatic visual demonstration illustrates the limits on farm land, making the importance of conservation clear | Maths, Social Studies, Science, Geography | Dividing, observing, problem solving and deductive reasoning | 5 min |
| 2. | The stock and the grim reaper | In a short demonstration using colored water and measuring cups, students observe how populations grow when birth rates exceed death rates. | Social Studies, Science and Maths | Observing, critical thinking, calculating with factions | 5 min |
| 3. | Bacterial bottle | A riddle which illustrates the concept of exponential growth with a story of bacteria multiplying by division in a laboratory | Social Studies, Science, Maths, Music | Critical thinking, plotting of graphs, deductive thinking | 5 min |
| 4. | Timber | Through a role playing activity, students observe what happens to a forest when the demand for wood is greater than the supply. | Maths, Social Studies, Language Arts, Science | Adding subtracting, working in cooperative groups, interpreting data, poetry writing | 15 min |
| 5. | Population riddles | A series of riddles designed to help students understand the concept of exponential growth and appreciate the size of numbers — millions and billions. They relate these numbers to common life experiences | Maths, Social Studies, Science | Counting, Multiplying, Dividing, Measuring using basic formulas | 5 min. |
| 6. | Hunger banquet | Students participate in a luncheon game that simulates inequities in the global distribution of food and wealth | Family Life Education, Social Studies | Communication, bargaining, conflict resolution, strategic planning, writing | 20 min |
| 7. | Video: World Populations | A six minute film which depicts population growth from the year 1 A.D. through the year 2020 | Social Studies, Science | Observing, critical thinking, deductive reasoning, interpreting data | 10 min |
| 8. | Discussion, comments and evaluation | Participant will be able to give comment or ask questions related to the presentation.<br>Each participant will also be able to evaluate the presentation | Social Studies | Applications, communication and evaluation | 15 min |

# Economy in Transition as a Bridge for Transfer of Know-how between the Worlds - Case Study : Pollution Prevention

***Mecislav Kuras(1) and Vladimir Dobes(2)***
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***2) Czech Cleaner Production Centre, 110 00 Prague, Czech Republic***

## SUMMARY

This paper starts with description of training programs in cleaner production (CP) which are being implemented in the Czech Republic since 1992. Experience from learning process is described for main target groups. The main lesson learnt is that CP learning process should be built on a principle of "learning by doing". This is true both in training and in education.

And this is true also in new countries where the Czech lecturers and consultants assist in introduction of CP. The paper highlight the case in which training of trainers in field of pollution prevention/cleaner production implemented within the Czech-Norwegian Cleaner Production Project provided a background for later transfer of this know-how to a developing country at the end.

## BACKGROUND

Cleaner production (CP) is an environmental strategy, with its focus on prevention, which reduces or eliminates wastes or pollutants at the source during production process. CP generates financial, as well as environmental, benefits by encouraging companies to use inputs - from raw materials to energy - more productively. Unnecessary wastes are avoided through enhanced process efficiencies. By way of CP, environmental improvement and competitiveness can go side by side.

CP was introduced into the Czech Republic through the Czech-Norwegian Cleaner Production Project which started in 1992. The project have focused on training of trainers and included on-the-job training at demonstration sites.

Long-term training programmes are instrumental for creating a pool of active consultants and trainers. Interaction between people from academia, public and private sectors is very important to enhance a learning process.

Two universities were the first pioneers in implementing these postgraduate courses in CP; Institute of Chemical Technology, Prague, and Faculty of Technology, Zlin. More than 150 Czech professionals was trained by them already and these participants were awarded internationally recognised Professional Development Certificate. Other Czech universities have already integrated CP into existing curriculum; or have lectures trained in CP .

The professional capacities which are available in the Czech Republic are being used in projects in Croatia and Uzbekistan which also aims to build basic capacities for CP. This transfer of know-how is very effective because of the Czech lecturers know local language and culture. Also, the know-how is already amended to local conditions using experience from its implementation in the Czech Republic. The paper will focus on experience from this know-how transfer.

## INDUSTRY

Industry is the main target group in promotion of CP. Implementation of CP within an industrial enterprise depends fully on day-by-day behaviour of its employees. It is not possible to achieve sustainable CP program only through consulting. People's thinking and attitudes towards production has to be changed and training is therefore the most efficient tool here.

Top managers usually do not have time to participate in long-term training. Short-term seminars should be designed to be sufficient for them. Top managers start to take CP as a method to manage material, energy, and financial flows along the production process, once they understand effectiveness of this systematic approach and/or they find encouraging results from their actual operations.

Middle managers are source of people who should be trained in a long-term training so that they know how to implement CP Assessment, thereby being CP promoters within a firm after the external assistance is over.

Some key-people on work floor can be trained in a long-term training as well. On-the-job training within the CP program, however, is normally sufficient.

In all cases the key to success of CP training is to involve all people at different levels within a firm into one learning process. They need to know by doing it themselves a way how CP methodology works in their enterprise and they need a lesson that it works only through their team work.

There is a very good experience with long-term training which include demonstration projects. The training lasts 8 - 12 months and contains a set of lectures (plenary sessions) and on-the-job training on a case study (demonstration project) in an industrial enterprise under a supervision of a consultant (this model is described e.g. in Best Practice Guide for CP Programmes in CEEC`s, OECD, 1995).

During learning process within an enterprise, people's personal feelings and relations should be taken into consideration. For example, people who do not participate in the long-term training but are somehow involved in work on CP Assessment often feel personally jeopardised and they consider CP as a tool for revealing the areas of their faults at work. And/or they often regard CP as simply waste of time.

Learning process should be guided by an outside consultant at the first stage. Consultants who provide methodological guidance of CP case studies in enterprises should have a very good command of interpersonal skills. For example, if they find a certain CP option, they should steer people towards finding this option by themselves so that they can have a sense of their own achievements.

The turning point in the learning process comes usually at this moment, when people of the CP team first discover good housekeeping options. On initial reaction, they feel a bit shamed that they have so long ignored it. At the same time, however, they grasp a sense of how the method works. It is their method, because they discovered the option by themselves. They start to be able to look at the production process from different perspectives. They may not call it CP but they will practice it. And this is the aim of CP training.

**GOVERNMENTS**

Here again, the most important principle is "learning by doing". People from governmental organisations need to be exposed as well to experiences on how an enterprise operates and how pollution is generated.

The problem that should be overcome here is to find a proper case study for on-the-job training for government officials. In the Czech Republic, they cannot attend case studies in industrial enterprises as outside participants, due to their enforcement role. (This is possible for people from universities and consulting firms, for example.)

There are good experiences in training people from governments at facilities which belong to their organisation - this could be a fire station, for example. Or it could be simply an office itself (experience from the Netherlands or Denmark).

The model for training of government people being applied for the time being in the Czech Republic is a short-term interactive training (4 days), which is attended by governmental officials along with people from industry. This seems to be very important for transferring practical experience from enterprises and to make officials understand causes of pollution generation.

To provide practical experience in the short-term training, simulation games based on a real case study are being used. Participants learn a lot from each other. Particularly, the simulation game Fun Factory has produced great success here. The whole CP Assessment process can be simulated through this game when financial flows are factored into the game as well. It is also possible to show the importance of the good management system for CP and explain specific steps in introducing Environment Management Systems (EMS).

**STUDENTS**

Introduction of CP into curriculum is of high strategic importance. Probably the most developed education system in respect to CP is found in Australia, where so called "Australians All" provide educational modules in CP for children at kindergartens up to students at universities.

Once again, "learning by doing" is the most important principle in CP learning process within this target group. Exercises and simulation games should be used extensively. It seems to be efficient to integrate CP into existing subjects as their natural part. For example if explaining how some technological process works the students can be asked to do a material balance at some example and they can be encouraged to suggest some options for more effective use of raw materials. They can evaluate an option and see how the waste was diminished at the same time.

This should not be limited to theoretical subjects. At the polytechnic university in Lubeck, Germany, for example, they have introduced CP into chemical practices with very good practical results.

Students can also work on a project in an enterprise. In the Czech Republic, students gain a lot of practical experiences by assisting enterprises in doing CP Assessment under a framework of ongoing CP projects. This can be done with a high success also in service sectors. For example two Dutch and two Czech students have developed very good CP demonstration projects in two big Czech hotels. The environmental and economic effects in service sectors were comparable to those in industrial sectors.

Institute of Chemical Technology, Prague have assigned one doctor thesis student to implement a three year project on development of system for implementation of CP on enterprise and local level.

## FURTHER TRANSFER OF KNOW-HOW

The training know-how transferred by the Norwegian Society of Chartered Engineers (World Cleaner Production Society) to the Czech Republic in 1992-95 was further modified especially thanks to the UNIDO/UNEP CP Program and it is being further transferred to third countries.

The Czech Cleaner Production Centre is implementing long-term training in CP including implementation of case studies/demonstration projects in Croatia and Uzbekistan. Both projects are being implemented within multilateral assistance of United Nations Industrial Development Organisation (UNIDO) and project in Croatia is financed by the Czech government.

Both projects proved that experience with training of different stakeholders is very similar to experience from the Czech Republic. What is important, there are no language barriers between lecturers and participants as the Czech lecturers are able to communicate directly in Russian language (in case of Uzbekistan) or understand local language (in case of Croatia).

## CONCLUSION

The aim of CP learning process should be to make CP a natural approach. The final success is achieved when people do not call it CP any more but they practice it continuously as a natural part of their life. This can be achieved through "learning by doing". This approach is being successfully transferred from Norway through the Czech
Republic to third countries (Croatia and Uzbekistan).

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## Community Understanding of Biodiversity and Ecological Relationships - The Basis for Implementing ESD Principles.

**Peter Lehmann**
**Greening Australia (South Australia)**

### Summary

Community based non government organisations are well placed to achieve huge shifts in community attitudes and values while at the same time achieving significant on ground environmental works.

Arguably the World's greatest need is for people to quickly gain a greater understanding of biodiversity and ecological relationships so that ESD becomes a reality.

The MMMoB (Monitoring, Managing, Maximising our Biodiversity) program, or Triple M mob is about monitoring animal lifein an area, as a measure of biodiversity change resulting from revegetation and habitat refurbishment works.

Greening Australia has built on the community "Watch" programs to develop a recipe whose ingredients include a solid base of government commitment, seed funding, community based on ground work and a real educational process that has a closed, positive feedback loop in that the positive outcomes stimulate continued community commitment to action.

### Beginning

A number of factors identified the need:

- No government can ever pick up all the costs and responsibilities for environmental care. It is up to each and every person to incorporate that responsibility into their daily lives.
- There is an increasing need by government agencies to properly justify expenditure of public monies, and a consequent demand on recipients to provide more comprehensive feedback on the outcomes of their investments.
- There needs to be an attractive, easy way of motivating communities to action and empowerment to better manage their local environments.

A solution might have the following characteristics:

- Easy and fun
- Provide a positive experience which encourages further action for the environment.
- Provide value-adding by taking a monitoring program a little further but not making it overly cumbersome.

### Rationale

- Human impact has resulted in significant changes to the quality and quantity of our indigenous vegetation cover and led to degradation of soils and water quality, and therefore sustainable production. Furthermore global clearance of vegetation and burning of fossil fuels is producing enormous amounts of carbon dioxide and exacerbating the Greenhouse Effect. There is an urgency for action to abate these problems. That action must be implemented by and within the community framework.
- Degraded vegetation is not likely to provide suitable habitat for many fauna species. Revegetation and habitat refurbishment projects will improve total biodiversity in an area.
- People learn best by doing. A successful project is most likely to be local and achievable. Doing provides quality learning and ownership of the project.
- Ownership of a project implies a degree of control over decision making and processes, which in turn raises self-esteem and stimulates further action. Planning, implementing and monitoring on-ground works provides the mechanism for increased knowledge and understandings, and changes in values and attitudes over time.

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- On-going management processes and promotion of on-ground environmental works will involve others over time, and the knowledge and skills, and the attitudes and values are passed on. At the same time the environment changes for the better.
- Greatest success and ongoing commitment arise from a process having a closed, positive feedback loop where the positive feedback provides the incentive for, and stimulates further actions.
- The more people are empowered, and the sooner they are, to implement ecologically sustainable development principles, the greater will be the World's chances of surviving.
  From the local achievements comes an understanding of contributing to a global environmental responsibility.

**An invertebrate monitoring program**
The MMMoB program is based on the premise that invertebrate species diversity and populations are good indicators of the quality of indigenous vegetation.

Poor quality indigenous vegetation, lacking in biodiversity, is most likely to have limited animal diversity within it. By enhancing the vegetation with more of the original species it follows that the animal diversity will increase (or at least the balance will change) as a consequence of increasing the range of habitats now available.

Monitoring of animals often requires capture in order to have time to recognise or identify them. Capturing (and possibly harming) vertebrates has inherent ethical, cost and other problems, whereas invertebrate capture is probably easier and not fraught to the same degree with ethical issues.
Capturing animals, particularly invertebrates, requires people to become more observant of their surroundings, including observing relationships between organisms and their surroundings.

This is a subtle process that leads the person along a learning path of increased knowledge and understanding of relationships and processes in the natural living environment, altering values and attitudes over time.

The feedback is likely to be an increase in species types and changes in populations. Perhaps some species will diminish in number as a consequence of inflow of predatory or competing species; exotic species may succumb. The results will need to be analysed and interpreted in the light of understandings developed during the monitoring process in the field, and from other sources.

The investigative nature of monitoring develops in the investigator an appreciation of scientific processes, instrument design and construction, skills in use of techniques, and data collection, display and interpretation. The spinoffs are a greater appreciation of how science influences developments and change.

There will always be a need to monitor the vegetation at some stage in order to determine the actions required for further enhancement and revegetation. It is not intended to cover the issue of vegetation monitoring in this Paper.

**The aims of MMMoB are:**
- to raise general community awareness of biodiversity and ecological issues and their relationship to sustainable management of natural resources.
- to encourage participation by schools, land owners, community groups, local authorities and government.
- as a result of this awareness, to encourage and assist communities to take actions for revegetation and habitat refurbishment works, and in so doing, gain a better understanding of natural ecosystems and the importance of wise management of natural resources.
- to contribute to the management of Australia's living resources by providing data to local and national data bases

MMMoB provides opportunities for the community to learn about the quality of habitats and ecosystem, the value of biodiversity and sustainable management of natural resources.

In turn MMMoB will help community groups, local government, landowners, catchment boards and schools take practical action to protect, maintain and improve indigenous vegetation cover.

The MMMoB program brings together school and community groups, landowners, local government and local catchment and soil boards. Through these links community Triple M Mobs enhance their credibility and gain access to the expertise and resources of community organisations like Greening Australia and local and state government agencies.

For some groups the principal focus is education and awareness while other groups may concentrate on establishing baseline data about biodiversity. Some groups may target specific perceived biodiversity issues in their region with the intention of undertaking revegetation or habitat refurbishment action.

To assist in the training and development process, including knowledge, understanding, skills and networking, appropriate support and resources must be available. A manual is being developed along the lines of the "Waterwatch Manual - Catchment care and water quality monitoring in South Australia. A guide for students, teachers and community groups." The manual provides users with explanations of the various monitoring techniques and offers choices about the level at which monitoring may be undertaken. Groups can choose the level that suits their knowledge, skills, support network and budget.

**Educating for Ecologically Sustainable Development.**
It is often thought that there are necessarily different approaches required to develop education programs for schools and for the wider community.

The Australian government has developed environmental education programs which are aimed at whole communities. The close correlation between the principles for environmental education of the Australian government and South Australian education department are highlighted in the following table:

| From *Educating for ESD, Background Briefs*; DEST, 1995 | From *Environment, a handbook for teachers*; Education Department of South Australia, 1991 |
|---|---|
| Components of environmental education:<br>• Raising knowledge, awareness, understanding<br>• Enhancing attitudes, values and motivation towards the environment<br>• Promoting skills development<br>• Providing opportunities for action | Environmental education seeks to:<br>• Develop an understanding of the total environment<br>Develop positive attitudes towards the environment<br>• Develop skills which will enable students to be<br>• Actively engaged in the well being of the environment |

**Developing a Unit of Work**
The author developed a topic, Measuring Biodiversity, targeting year 9 students and basing the teaching and learning on activities from the Nationally Developed Statements and Profiles for Australian Schools - Curriculum Framework. See Appendix.

The "Learning from the Statements" section contains descriptions of student learning that have been selected because of their relevance, from the much larger "Nationally Developed Statements and Profiles". Of the eight Areas of Study, Studies of Society and Environment, Science and Technology have been selected for this particular unit of work. Other emphases can be placed on developing a topic with a similar content base by changing the area of study or focus within an area of study.

The question arises as to the relevance of developing a topic for community education by referring to a formal curriculum framework. Could one just as easily produce a teaching/learning sequence without reference to any guidelines?

- The reality is that whether the education program is aimed at schools or the general community, there is a need to have:
  - -objectives.
  - -a process that involves sequencing of teaching/learning.
- Analysis of the objectives shows that there is very strong correlation with the identified components of environmental education.

-Knowledge, awareness, understanding come through strongly in objectives 1,2,4.
-Attitudes and values in objectives 1,4 with links in 5.
-Skills in objectives 3,5.
-Action in objectives 1,3,5.

It is apparent that the descriptions of learning provide a guide that outlines the scope of learning and preferred ways in which people learn, and that the formal curriculum is a valuable resource to help develop community education programs.

We all need to do things differently from our present ways in order to achieve ecologically sustainable development educators need to see themselves as learners, and to include other learners in the community as part of the process when considering how learning works best for them. For example different situations require consideration of factors like context, setting and suitability.

**Conclusion**

Community based non government organisations have people in the field, working alongside the community, supporting their environmental actions, and are well placed to provide direction and facilitate the growth of the community's knowledge, understandings, skills, attitudes and values through education programs that involve learners in making decisions about their unique situations.

Triple M mob program is one pathway that has the ingredients for success - easy and fun to undertake, providing a positive experience which stimulates further actions for the environment. The invertebrate monitoring approach provides a subtle process for personal discovery of the knowledge and relationships between living things, and with their non living surroundings by placing people in direct touch with their local fauna and flora on a daily basis. It also provides personal understanding of the human impacts and initiates changes in land and water management practices, reflecting changed attitudes and values.

The changes occur because the people who can make the difference are now empowered and more likely to do so.

Ecologically Sustainable Development moves closer to reality.

## APPENDIX

TOPIC Measuring biodiversity

OBJECTIVES *(What students will know, value, understand or be able to do)*

- Understand what individuals can achieve locally and how they can contribute to global environmental responsibility.
- Recognise the range of biodiversity in a place
- Can undertake a biodiversity monitoring program
- Understand biodiversity, ecological relationships, and value the living environment.
- Report, promote the project to the wider community.

**YEAR LEVEL 9**
This particular plan emphasises the investigative/scientific approach; other approaches might emphasise social justice and inclusivity, or democratic process and legislation.

### Learning from the Statements

The following dot points have been selected from the nationally Developed Statements and Profiles for Australian Schools - Curriculum Framework

### STUDIES OF SOCIETY & ENVIRONMENT

*Value cluster* -Ecological Sustainability

*Perspective* -Global Futures

(Other value clusters and perspectives could be targeted instead)

### Investigation, Communication & Participation

- Personal, physical and emotional development promote & enable a growing understanding of the relationships between individuals, groups & their environments.
- Become more aware of the social & political world around them & their rights & responsibilities.

### Place and Space

- Study of the factors and processes influencing places applies to aspects of the natural and built environments.
- Analyse and represent spatial data in a variety of ways, using regional topographic and thematic maps.
- Apply understandings about the consequences of human modifications to the natural & built features of places & predict future consequences of planned modifications to places.
- Conduct independent fieldwork for the collection & representation of information, with teachers contributing to the analysis & evaluation of findings.
- Focus of study will normally range from the local to the national with less attention being given to global patterns, although there is some transferring of information & generalising from one scale to another eg vegetation characteristics of the local area or region may be used to develop broader understandings of Australia's vegetation regions, consequences of planned modifications to places.

### Natural & Social Systems

- Use flow charts to illustrate systems & use & construct maps, graphs and tables to explain the structures found in natural systems.
- Use this information to predict possible futures & to speculate about preferred futures.
- Gather information on local, national & global environmental issues to simulate planning decisions & to debate alternative solutions. Come to identify own beliefs & perspectives on environmental issues & how they acquire them to understand the beliefs & perspectives of others & to identify possible areas of agreement on which to base decisions.
- Organise projects aimed at improving the local environment & compare & evaluate ways individuals can influence decisions affecting the natural systems.

## SCIENCE

### Working Scientifically

- Become critical-minded and sceptical about evidence.
- Take into account ethical and social considerations.
- Design equipment to make measurements eg Tulgren funnel, pitfall trap.
- Record findings using scientific and mathematical conventions.
- Plan and consider - design, equipment, data collection, analysis, sensitivity to purposes, validity and reliability.
- Consider the intended/unintended consequences of action and immediate/longer term implications.
- Communicate to a range of people (teachers, peers, community groups) in a range of forms (reports, articles, oral presentations, posters).

### Earth and Beyond

- Study scientific principles of alternative techniques in conservation through context of students' concerns for environment and responsible use of Earth's resources.
- Undertake detailed case studies on the management of resources and the effects of human activities on the environment.

### Life and Living

- Investigate local environments and analyse relationships in food webs.
- Distinguish between producers, consumers and decomposers and discuss their roles.
- Examine the modification of natural systems and monitor the effects of environmental changes on living things.

## TECHNOLOGY

### Design, Make & Appraise

- Generate alternative design proposals and action plans.
- Explore a variety of techniques to achieve their intentions.
- Use equipment to specific degrees of accuracy and precision.
- Create processes and products that meet specified standards.
- Modify designs following qualitative and quantitative assessments of performance.

### Systems

- Consider how systems affect management processes at local and global level.
- Assemble systems to perform specific functions.
- Modify systems based on measurements of performance

**Suggested Teaching and Learning Sequence** * Assessment opportunities

1. Determine what is biodiversity and why it is important.
   -use reference material (See Resources)
2. Recognise a range of organisms -plants, vertebrates and invertebrates - at a location.
   -use reference books (See Resources)
   -compare with drawings, pictorial keys
   -use microscopes, lenses
3. Determine what is a habitat and ecosystem.
   -examine different habitats in a location
   -examine the relationships between organisms and the non-living environment in a location, and examine the consequences if these needs are not met eg food chains, shelter. Display information
4. Establish a need for action to improve the environment.
   -global picture
   -human impact on environment - negative, positive; people's rights and responsibilities, Earth's resources; increasing concern about environmental issues; preferred futures.
   -increase plant diversity, changes in animal biodiversity
   -revegetation/ habitat enhancement with indigenous species

-monitoring for change

5. Locate a suitable site for revegetation/ habitat enhancement project.
   -(as another Topic)
   -factors determining location including reasons for preferences
   -predicting possible outcomes of the project at the location, environmental improvements, unintended outcomes
   -constraints to monitoring invertebrates
   -working collaboratively with a local community group's project - aims, strategies, decision making processes, environmental outcomes
   -map the location - features, orientation, scale, monitoring points
   -view to replicating the program at a different location
6. Investigate invertebrate monitoring techniques.
   -invertebrates as a measure of environmental health
   -standardised techniques, reliability
   -design, construction of apparatus, costs - eg Tulgren funnels, pitfall traps, nets (See Resources)
   -develop skills in the techniques - accuracy, reliability, repetition
   -appraise techniques - evaluate, modify designs, techniques and monitoring procedures
   -planning and design of project - timing of monitoring, locating monitoring equipment
   -data collection and recording - tabular, computer
   -ethics, responsibility in relation to trapping and killing animals.
   -continuity of monitoring program, ongoing management
7. Conduct invertebrate monitoring to detect changes in biodiversity for a revegetation/ habitat enhancement project.
   -scientific rigour, validity
   -replication
   -materials treatment, storage
   -invertebrate recognition
8. Report findings.
   -data records, data processing
   -critical analysis, interpretation of data
   -communicate findings - range of people, range of forms; environmental effects
   -promote, encourage others to become involved in the program
   -suggest further actions for environmental improvement - managing the project location, expansion; new location

**Resources**

Greening Australia can provide:
   -technical assistance with revegetation/ habitat refurbishment project location.
   -resource package containing invertebrate monitoring techniques and invertebrate recognition material.

Hand lenses, binocular microscope.

Books: MMMoB Manual (Monitoring, Managing, Maximising our Biodiversity)
Biodiversity and Ecologically Sustainable Development -

READINGS: Michie M, Whiteford B, McMillan R; Australian Association for Environmental Education National Professional Development Program, 1995; ISBN 0 9589087 7 X

# USP RECICLA: from Pedagogics to Technology
## A waste minimization programme

***Ruy Laurenti — Academic Coordinator***
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***Patricia Blauth and Patricia Leme — Environmental Educators***
***University of Sao Paulo, Brazil***

### WHO WE ARE

The University of São Paulo is Brazil's largest institution of higher education responsible for the formation of most of the professionals with a Master's degree and for Brazilian scientific production. With 6 campi in 6 cities, 44 colleges, institutes and museums, and a population of 80 thousand people, including employees, teachers and students, USP produces a lot of garbage! The campus of the capital alone produces about 9 tons a day!

Considering the implications of this generation of wastes, based on the guidelines of the Agenda 21 and, still, admitting the need for an environmental policy for the University, USP started in 1994 the Program *UPS RECICLA*[1]

USP RECICLA has a planning committee composed of representatives (teachers and employees) of each campus of the university, an academic and an executive coordinator and 2 environmental educators.

### WHAT WE WANT

USP RECICLA, described briefly as an internal waste minimization program, based on the principle of 3 the Rs (reduction in the consumption and in the waste, reuse and recycling of materials) aims at:

1. strengthening, in the university community, the concern with environmental conservation by discussing the issue of solid wastes,
2. contributing for the improvement of environmental health and quality, with an appropriate management of that community's wastes, and
3. fomenting research on waste minimization.

The program still intends:

1. to define mechanisms for the rational consumption of paper, among other materials, and for the adoption of post-consumer recycled paper,
2. to reduce the amount of USP's wastes destined to dumps and landfills in the cities where its 6 campi are located, and
3. to develop a curbside recycling program that can be a reference for similar institutions.

### HOW WE WORK

The development of the program in each Unit (college, institute or museum) begins with the characterization of the wastes produced. Daily samples of garbage are studied and the potential for the reduction, reuse and recycling of materials is evaluated.

With these data the community of the Unit is invited to participate of the several educational meetings

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[1] The choice of a snail as symbol of the program is due to the concern with the development of a permanent educational process — the snail moves slowly but constantly — aiming at lasting changes of behavior, in opposition to aggressive, but short-term, marketing campaigns. In place of the shell, the snail carried the arrows representing the principle of the 3 Rs for waste minimization (reduce, reuse and recycle).

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promoted by USP RECICLA. These meetings discuss the generation, handling and disposal of wastes, the environmental impact of natural resource extraction, recycling, composting, etc. The educational methodology adopted is essentially humanistic, focusing on the emotional and attitudinal aspects of the learning process. The work is centered more on the reflection around values and perceptions (of the environmental and of each person's role in environmental conservation) than on the mere transmission of "technical-scientific" information. The participants are motivated to suggest changes in procedures, individual and administrative, that result in a more sustainable consumption of materials, basically paper and plastic.

Each participant receives a cardboard box donated by a paper industry for disposing papers (in offices, class rooms etc.). These papers are then collected separately by the cleaning staff, removed to a sorting center in each campus, and sent to recycling industries.

In certain cases, as in the cities of Bauru and Ribeirão, Preto, USP RECICLA sends parts of its wastes to the municipal curbside recycling program, which allows the source separation of other recyclables, besides paper.

After the preliminary educational activities, the Units are visited regularly by trainees, that register the alterations in the generation of wastes and in the behavior of the local community, also collecting comments and suggestions for improving the program and stimulating people to actively participate in the new routine of disposal and collection.

## WHAT WE ACHIEVED SO FAR

USP RECICLA has had very positive results. With the change in the habit of employees, teachers and students, the daily production of garbage dropped at least 50%, in weight, in the Units involved in the program.[2]

Several are the initiatives of spontaneous substitution of disposable plastic cups — the mean consumption was of 10 units/person/day! — by glasses and china cups. Of the suggestions of 3 Rs presented by the community itself, the following were already implemented, in one or another Unit:

1. the reduction in the types of envelopes offered by the central stationery deposit,
2. the suspension in the purchase of scrap paper pads,
3. the refund of toner cartridges for refill,
4. the substitution of mineral water bottles by drinking fountains, which don't require the use of cups, and
5. the separate collection and destination (for recycling) of fluorescent light bulbs, which are considered toxic wastes due to their mercury content.

Since the Program also presents the importance and advantages of composting, some Units separate their organic wastes. One of USP's nursery, for example, is composting since 94 all its food leftovers, grass, leaves, etc. with the saw dust discarded by the Campus administration. All employees and 110 children participate of this activity. The compost, excellent soil conditioner analyzed by one of USP's departments of chemistry, is being used in the nursery's vegetable garden, given to the children's families and sold to the general public. The pedagogical aspects of this work have even attracted the attention of educational TV programs, and the nursery is frequently visited by people interested in composting at schools or at home.

Although USP RECICLA is concerned with being a good example, and its educational activities aim at the university community itself, nearly 400 schools, companies, municipal administrators, non-government organizations, or people, in general, have called, visited or written the program in search of information. USP RECICLA has also been the theme of monographs and academic dissertations.

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[2] Our best example is probably the college of Physical Education and Sports, in the campus of São Paulo. By suspending the use of disposable plastic cups, source-separating paper and composting garden scraps and food leftovers, the college was able to reduce its garbage to nearly 10% of its original weight.

# Integrating environmental education
Across the curriculum in higher learning

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Holy persons draw to themselves all that is earthly....
The earth is at the same time mother,
She is mother of all that is natural,
Mother of all that is human.
She is the mother of all,
for contained in her
are the seeds of all.

Hildegarde of Bingen

**Abstract**

Educators at all levels are becoming increasingly aware of the need for Environmental Education to be regarded as a means of integrating knowledge, skills, attitudes and values from all learning areas into a holistic framework based on a process of lifelong learning.

This article looks at how Environmental Education was perceived in the past, and how it has developed, particularly in the context of the overall changes envisaged in education as a whole in South Africa. This includes legislation and curriculum development. It stresses the importance of developing an environmental policy and ethic in Higher Education.

Finally, it suggests ways in which tertiary educational institutions may tackle the challenge of integrating Environmental Education across the curriculum.

## 1 INTRODUCTION

Humankind is busy committing matricide as fast as it can. It is rapidly killing the Mother of all - Mother Earth. She is the one who provides everything that is needed for survival. All people therefore need to learn to care for Her, so that She can continue to care for and nurture humankind.

In ancient civilisations, such as hunter-gatherers, people learned to use the earth's resources in such a way that they could be regenerated, thus having little or no impact on their environments, and thus ensuring their survival. Today humankind is fast using up the earth's limited and non-renewable resources, thus threatening its own existence and survival (Dreyer, 1997:17-19). This reality creates a need for Environmental Education.

Opie in his book, *The outdoor classroom* , lists the most horrifying statistics revealing how Africa is becoming more impoverished every day. He explains why it is vital for everyone to take radical action "...to promote harmonious co-existence with the land at all levels" (Opie, 1989:3). We need to learn to "...generate the environmentally desirable behaviour upon which the future survival of our country depends" (Opie, 1989:4).

This article looks at how educators might effect the above by integrating an Environmental Education orientation across the curriculum in Higher Education.

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## 2 THE DEVELOPMENT OF ENVIRONMENTAL EDUCATION

In the past the education system in South Africa included environmental awareness mainly as a concern for nature, and particularly the conservation of endangered fauna, flora and habitats. This took place more in the informal and non-formal sectors of education. In formal education, i.e. in schools, the focus on environmental education was called "Nature Study ". Many people even today, have this"Environmental Education".

## 3 DEFINING ENVIRONMENTAL EDUCATION

Briefly, the **environment** can be described as everything on, below and above the Earth. It includes all natural, man-made and human environments. In other words, it includes the **total** environment - socio-political, cultivated and natural (Dreyer, 1997:54).

**Environmental Education**, however, necessitates a more specific definition that involves educational principles and practice.

Internationally, Environmental Education is defined as: "... the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture and his biophysical surroundings. Environmental education also entails practice in decision making and self-formulation of a code of behaviour about issues concerning environmental quality" (IUCN-document quoted in Dreyer, 1997:53).

A South African definition is: "Environmental Education is a process that seeks to develop the necessary awareness, knowledge, concepts, ethics, values, skills and commitment to allow people to become environmentally literate in order to be pro-active in securing a healthy and properly functioning environment that is sustainable" (EEPI as quoted in Dreyer, 1997:53).

The EEPI definition adds that " ... this is as true for people"s local environments as it is for regional and global environments" (EEPI in Dreyer, 1997:54).

In short, Environmental Education concerns education **about** the environment, **in** the environment, **for** the environment, and **through** the environment (Dreyer, 1997:54). What could be added here is "**with** the people in the environment". This includes by implication the decision making and action components of learning, in addition to a mere understanding and knowledge of the environment.

In this article a more holistic and comprehensive perspective on Environmental Education is offered: "Environmental Education is a holistic, lifelong process of becoming aware of, appreciating, valuing and contributing to the creation and development of the kind of environment that is healthy and sustainable. This process includes:

### 3.1 A broad band of understanding

- theoretical and factual knowledge about the environment;
- knowledge of human behaviour and how it impacts on the total environment; -
- knowledge of relationships (man to man, man to God or Higher \tab Power, man to the environment);
- attitudes (which are reflected in behaviour) of caring for and \tab responsibility towards the total environment;
- attitudes of curiosity and wonder which become part of a culture of learning;

### 3.2 A broad band of skills and processes

- understanding of processes - processes of learning (learning how \tab we learn), processes of interaction, cycles, eco-systems, and others;
- skills of being able to have fun and enjoy the environment;
- skills of planning, decision making, problem-solving, leadership;
- skills of clarifying values (and helping others to do so);

- skills in communicating, so as to be able to empathise with others and influence others positively towards the total environment. This includes ethical and moral aspects of humankind towards Mother Earth and beyond; and -
- commitment or preparedness to accept accountability for the \tab consequences of decisions and behaviours that affect our environments."

## 4. GLOBAL CONCEPTS

Capra, (1996 : 289) refers to ecological literacy. "Being ..."ecoliterate" means understanding the principles of organisation of ecological communities (i.e. ecosystems) and using those principles for creating sustainable human communities. We need to revitalise our communities - including our educational communities, business communities, and political communities - so that the principles of ecology become manifest in them as principles of education, management and politics."

## 5 RECENT DEVELOPMENTS IN ENVIRONMENTAL EDUCATION IN SOUTH AFRICA

In 1991, the Department of Environmental Affairs and Tourism and the various education departments decided to launch a project to develop a strategy for incorporating Environmental Education into formal education. A **Working Group for Environmental Education** consisting of role players from a wide range of sectors was appointed, a discussion document compiled and workshops held in 13 regions, involving key role players. Feedback was processed into the discussion document and a national workshop was held for debating the incorporation process. International experts were drawn in as speakers, and follow-up workshops were arranged (Dreyer, 1997).

**Important policy outcomes** of the project include the following:

- Environmental Education is to be considered an essential element \tab of the curriculums of both schools and teacher training institutions;
- Environmental Education is to be viewed as a broad, holistic concept \tab that encompasses social, economic and political components, as well as a biophysical component;
- Environmental Education should be included in existing curriculums, \tab and there may be a need for specialist courses; and
- policy options and measures should be developed for the incorporation of Environmental Education in formal education.

With regard to the latter, a management committee was appointed to develop policy options in a process called the "Environmental Education Policy Initiative " (EEPI). During this process, several important documents were developed. These documents contain information revealed by the situation analysis, as well as the aims of Environmental Education. One of the documents is called *Environmental Education policy options for formal education in South Africa (EEPOFFESA): A source document for curriculum development in Environmental Education*, (see Dreyer, 1997).

### 5.2 Environmental Policy Options

This document contains four possible options for implementing Environmental Education in formal education. One or more of these can be used. Briefly, they are:

- local problem-solving (cross-curricular) focusing on local community \tab situations;
- integration into existing subjects/disciplines/learning areas;
- specialist/distinct courses - as a career subject (e.g. Environmental \tab Health); and
- components within existing subjects (e.g. environmental impact assessments (EIA) in Engineering).

In 1994 the Department of Education launched a national project to engage in curriculum research into Environmental Education, based on the findings of the EEPI. In June 1995 the Heads of Education Departments Committee (HEDCOM) approved a "Curriculum Development Project for Environmental Education." The aim of this was to deploy a national, participatory process to develop the optimal or most effective methods and techniques to implement Environmental Education in formal education.

### 5.3 Environmental Education Curriculum Policy

A discussion document, compiled by the Environmental Education Curriculum Initiative (EECI) in collaboration with the Environmental Education Association of Southern Africa (EEASA), the Department of Environmental Affairs and Tourism, members of provincial education departments, the ENJF, the HSRC and other role players was published in April 1997. This document supports the inclusion of environmental concerns and the development of quality learning programmes for Education and Training in South Africa. The document is called *Enabling Environmental Education as a cross curricular concern in outcomes-based learning programmes (EECI 1997a)*, and is in line with a new "outcomes-based "approach to education in South Africa (see point 8 for more detail).

## 6. ENVIRONMENTAL EDUCATION CURRICULUM GUIDELINES

### 6.1 Outcomes-based Education and the National Qualifications Framework ("NQF)

The NQF sets out the cross-disciplinary aspect of Environmental Education and incorporates the intention of achieving a more integrated curriculum approach. It is important to realise that learners get a disconnected and fragmented preparation for life when the curriculum treats subjects such as Nature Study, Geography, Biology, Health, and Economics, as independent, rather than interdependent disciplines.

In the past it was left to the learner (or the inspired teacher assisting the learner) to make the connections and draw the understanding of how the sum of the experience is greater than all the parts.

It is this inter-relatedness of specialised curricula which lies at the heart of the National Qualifications Framework. The educational focus promoted by the NQF subscribes to an outcomes-based application. Curriculum 2005 is the practical realisation of an outcomes-based approach to education.

### 6.2 Curriculum 2005 : Broad Approach towards Environmental Education

In February 1997, a document was published *called Curriculum 2005: Lifelong learning for the 21st century*. It contains guidelines for the implementation of the new system of education which will be phased in over the next few years (Department of Education, 1997:6-7). This new curriculum shows a number of conceptual changes to previous plans for learning:

- instead of passive, content-based learning, active, outcomes-based \tab learning should be encouraged;
- critical thinking, reasoning, reflection, connection and application should be promoted;
- tab relevant knowledge should be integrated and connected to real life \tab situations;
- and teamwork should be encouraged to consolidate the \tab new \tab approach;
- teachers have to be innovative and creative in designing content and contextual programmes;
- learners are to take responsibility for their own learning. They \tab should be motivated by constant feedback and affirmation of their \tab worth;
- emphasis is on outcomes;
- flexible time-frames should allow learners to work at their own pace;
- assessment is on an ongoing basis; and
- input from the community is encouraged.

### 6.3 Cross-disciplinary aspects of Environmental Education : Outcomes

In addition to the above guidelines, *Curriculum 2005* proposes two kinds of outcomes: Critical Cross-field Outcomes and Specific Outcomes.

**Critical Cross-field (Essential) Outcomes** will apply to all the different learning areas discussed in this document. The following two outcomes have specific relevance for Environmental Education:

- to use science and technology effectively and critically, showing responsibility to the environment and the health of others; and

- to understand that the world is set of related systems. This means that problem-solving contexts do not exist in isolation.

**Specific Outcomes** refer to the specific knowledge, attitudes and understandings which should be displayed in a particular context. In the document *Enabling Environment al Education as a cross curricular concern in outcomes-based learning programmes* (EECI, 1997a:10) it is stated that: "For the specific outcomes to have meaning for the learners, they need to be contextualised, and it is here that environmental contexts have such a vital role to play in learning programme development."

## 7. LEGISLATION FOR ENVIRONMENTAL POLICY AND PRACTICES

The Constitution of South Africa enshrines the right of every citizen to a healthy environment (EECI, 1997a). The RDP advocates "...programmes to rekindle our people's love of the land, to increase environmental consciousness amongst our youth, to co-ordinate environmental education policy at all levels, and to empower communities to act on environmental issues and to promote an environmental ethic" (quoted in EECI, 1997a:6).

*The white paper on Education and Training* (1995) as quoted in the EECI document (1997:6) therefore states that "...environmental education, involving an interdisciplinary, integrated and active approach to learning, must be a vital element of all levels and programmes of the education and training system, in order to create environmentally literate and active citizens and ensure that all South Africans, present and future, enjoy a decent quality of life through the sustainable use of resources" .

*The white paper on Environmental Education* (Department of Environmental Affairs, 1989) indicates the aims, objectives and principles of Environmental Education.

### 7.1 The aims of Environmental Education

Environmental Education is aimed at stimulating education processes that develop responsible life-styles in harmony with the environment as a whole, on the part of all the inhabitants of the RSA, and making them aware of the fact that an acceptable quality of life is dependant on their judicious utilisation of the environment.

### 7.2 The objectives of Environmental Education

The main objectives of Environmental Education are:

- To make the population aware of the various elements of the environment and their interrelationships, and of the need for a healthy environment for the survival of mankind.
- To motivate people to accept responsibility for the environment and to cultivate the necessary knowledge and values in order that solutions may be found for identified problems.

### 7.3 The principles of environmental education

Environmental education should:

- consider the environment in its totality; natural and man-made phenomena, their interdependence and the ecological, socio-economic and cultural processes that affect them, that is all elements that have a bearing on human lives and the relationships between these elements;
- be a continuous lifelong process; it should commence at pre-school level and continue in the formal, informal and non-formal education sectors;
- be interdisciplinary in approach, characterised by a balanced outlook that emphasises the complexity of the interrelationships and problems of the environment;
- encourage active participation in learners of all ages by using diverse learning environments, a broad spectrum of educational approaches and all the available teaching aids to prevent and solve environmental problems;
- examine major environmental issues by focusing on current and potential situations and on the

learners's immediate surroundings and culture and relating topics under discussion to provincial, regional, national and international issues and perspectives; and

- stress individual responsibility towards the environment by emphasising both individual and collective involvement and the importance of public participation.

*The green paper on Higher Education Transformation* (Department of Education, 1996:5) in its "principles" recognises the academic freedom and autonomy which tertiary institutions will have in contextualising their learning programmes. It also affirms the public accountability to which these institutions will need to be held answerable.

## 8.1 IMPLICATIONS FOR TERTIARY EDUCATION IN SOUTH AFRICA

*The white paper on Environmental Education* (Department of Environmental Affairs, 1989:3) states that: "The implications for universities and colleges of education with regard to teacher training are expressed as :

- all student teachers must be made aware of the aims, principles and \tab methodology of environmental education;
- specialised programmes on environmental education must be \tab included in teacher training courses; and
- skills and techniques necessary for environmental education ... \tab should be stressed in the training of teachers."

Serving teachers will also have to receive in-service training in Environmental Education.

Technikons, universities and colleges of education will need to be aware of how policy and curriculum initiatives, as well as legislation will impact on their approach to environmental education: "Without concerted efforts at life-long education for sustainability, South Africa will not only fail to secure a competitive position in the world market, but equitable and adequate resource allocation will become very difficult. These intentions must be translated into all programmes of learning for all phases and levels and across all learning areas" (EECI, 1997a:6).

## 8.2 CROSS-CURRICULAR LEARNING

### 8.2.1 A conceptual model

Loubser (1997:33-43) discusses a range of options as to how environmental education may be integrated across the curriculum:

- within single disciplines (e.g. the fragmented model, \tab connected teaching and the nested model);
- integration across several disciplines (e.g. the sequenced-, shared-,webbed-, threaded-, and integrated models); and
- integration within and across learners (e.g. the immersed and networked models).

A comprehensive conceptual model of the integration of Environmental Education into all areas across the curriculum is presented in Addendum A.

At the centre of this concept is Mother Earth. It is divided into three compartments or aspects of a holistic environment: natural, man-made and human. These flow into the primary challenges facing mankind in its relation to Mother Earth:

- conservation of scarce and precious resources;
- fighting and preventing pollution; and
- building peaceful relationships with fellow man.

The above serve as a springboard for problem-solving, decision-making and skills development and are all connected by lifelong learning. These aspects can be related to any of the learning areas or disciplines, in a multitude of combinations.

## 9. RESOURCES AND STANDARDS FOR CURRICULUM DESIGN

### 9.1 The EEPI and EECI

In part A of the document "Enabling Environmental Education as a cross-curricular concern in outcomes-based learning programmes " (EECI, 1997a) the development and activities of the Environmental Education Policy Initiative (EEPI) and how it led to the establishment of the Environmental Education Curriculum Initiative (EECI) is described.

This document stresses the **empowerment** ...of communities to act on environmental issues and to promote environmental **ethics**.. ", and also "...international trends of education for **sustainable** living..." (EECI, 1997a:3). In its rationale it describes sustainability and sustainable resources, and how they are linked to "quality of life" (EECI, 1997a:6).

It further describes socio-historical, economic, political and bio-physical contexts of learning, and illustrates these with models (EECI, 1997a:7-11).

### 9.2 Environmental Education as a cross-curricular concern

Part B of the above document discusses the integration of Environmental Education within learning programmes. It details many examples of specific outcomes, possible interpretations, suggested applications, as well as methods and assessment approaches under each of the learning areas.

This is an invaluable document for educators to gain insight into the concepts and approaches envisaged. It will further help to create the paradigm shift which is needed in order to promote the transformation process in Higher Education.

(The document is available free of charge from the Department of Environmental Affairs and Tourism.)

## 10 IMPLEMENTATION OF ENVIRONMENTAL EDUCATION POLICY

One possibility of getting Environmental Education policy implemented is that working groups of interested parties and representatives of all structures at technikons and universities be formed to study, discuss and formulate an Environmental Education Policy which would be appropriate for their institution. They could view the implications and implementation of such policy at various levels, e.g.:

- at institutional/organisational level;
- at community level; and
- tab at academic level.
- at national level

### 10.1 At institutional/organisational level

At this level the implementation of such policy implies that educators should:

- support student initiatives which are developing structures relating to Environmental Education activities, both within the campus as well as in the wider community (at Technikon Northern Gauteng for example, student initiatives are in the process of establishing an Environmental Education and Development Centre on campus. They have workshopped their vision and mission, as well as their objectives and plans);
- support other initiatives (at the same Technikon the cleaning ladies have initiated an Envirocare project for collecting paper. Their committee has already been in existence for some years);
- get the communities around the institutions involved in environmental audits; and
- involve community leaders and business leaders in the community.

### 10.2 At community level

An example of tertiary education implementing Environmental Education policy at community level, is where Technikon Northern Gauteng invited students to apply their learnings on ecology to the nearby Soshanguve community. They used a social survey questionnaire, collated data on environmental conditions, and also raised the awareness of residents to the ecological impact of litter. The students found that residents could become learners, and that the wider consequences of ecology as it impacts their environmental habitat, could be explored together.

Thus, doing so stimulated a **lateral thinking** process which recognises the connections between health, comfort and environmental care on the one hand, and the economic benefits of pooling and recycling of recyclable materials on the other. Aspects of life which can be vertically specialised can be laterally recognised as part of a holistic life situation. This application of knowledge integrates life which realises new energy, excitement and greater participation between people previously isolated from each other and feeling helpless to deal with problems which need community and wider participation of all stakeholders to solve.

At Technikon Northern Gauteng is working with companies like Africon in conducting research on environmental health issues. Some staff members are also working with the Tswaing Metropolitan Council to develop, with the community, the Tswaing Environmental Education Centre.

### 10.3 Academic level here is viewed at both the intra-institutional and inter-institutional levels.

#### 10.3.1 Intra-institutional level

The implementation of Environmental Education policy at this level means to:

- initiate an environment al policy which can be included in the vision and mission statements of the institution;
- carry this through to the academic boards and councils;
- discuss methods and approaches by which environmental education may be integrated into various disciplines in a cross-curricular way;
- encourage an environmental orientation throughout all faculties and disciplines;
- contribute to research, or assist with research projects which have already begun (at Technikon Northern Gauteng certain interested colleagues have begun "An Investigation into the circulation of waste on the campuses of Technikon Northern Gauteng and/or the community of Soshanguve"); and
- based on environmental audits, undertake action research initiatives (Ferreira,1997:86-88). At the above Technikon the Environmental Health Institute under the auspices of Food and Health Technology, together with the Life skills facilitators and student initiatives, could start the process.

#### 10.3.2 At inter-institutional level

In 1995 a voluntary group called Greet came into existence. It was an acronym for"Group for Environmental Education Tertiary" (in Afrikaans it was "Groot" - Groep vir Omgewings Opvoeding Tertier). This group faded because it consisted of very busy, committed people, and they did not have the time to keep it going. If there is interest, this group could be revived.

## 11 ENVIRONMENTAL EDUCATION: THE CHALLENGE

What is it that academic educators hope to achieve ?

If one looks at other countries and compare them to South Africa - what is the finding? South Africa has a culture of littering. Its soil is the country's biggest export ... to the sea. Its landfill sites are mushrooming. Its air is being polluted. The list is endless ...

Each citizen has a responsibility to contribute to creating the kind of environment that is both beautiful and healthy, and most importantly sustainable.

Based on the principles of the Tbilisi Conference, the following should be considered as objectives for Environmental Education (Dreyer, 1997:59- 61):

- **realisation/awareness** - to assist individuals and groups to gain a positive awareness of and sensitivity to the total environment and associated problems;
- **transmission of knowledge** - to assist individuals and groups to gain experience - and develop a basic understanding - of the environment and associated problems;
- **creating/modifying attitudes** - to help individuals and groups to acquire a set of values, a sense of involvement and a motivation towards active participation (the acquisition of an environmental ethic);
- acquiring skills - to help individuals and groups to develop skills which will enable them to identify and solve environmental problems; and

- active participation - to give individuals and groups the opportunity to co-operate actively on all levels in order to solve environmental problems.

## 12. CONCLUSION

Environmental Education at formal, non-formal and informal levels is vital to the survival of our country and our planet. An appeal is made on all educators, learners and administrators to urgently and seriously contribute to an ethic of environmental responsibility.

In their book *South African environments into the 21st century*, Huntley, Siegfried and Sunter (1990:15) offer the following positive perception:

:Much of the available global evidence points to a wasteland scenario within the next century worse than the most negative predictions of the environmental lobby of the 1960s. Yet all is not gloom and doom. While the present generation of mankind is the first to have the power to drastically and irreversibly transform the planet for the worse, it is also the only generation capable or preventing such an evolution. Exciting opportunities are emerging for the imaginative use of new technologies which avoid pollution or which clean up environmental damage. Modern technology, once the greatest foe of many environmentalists may yet become their most valued ally."

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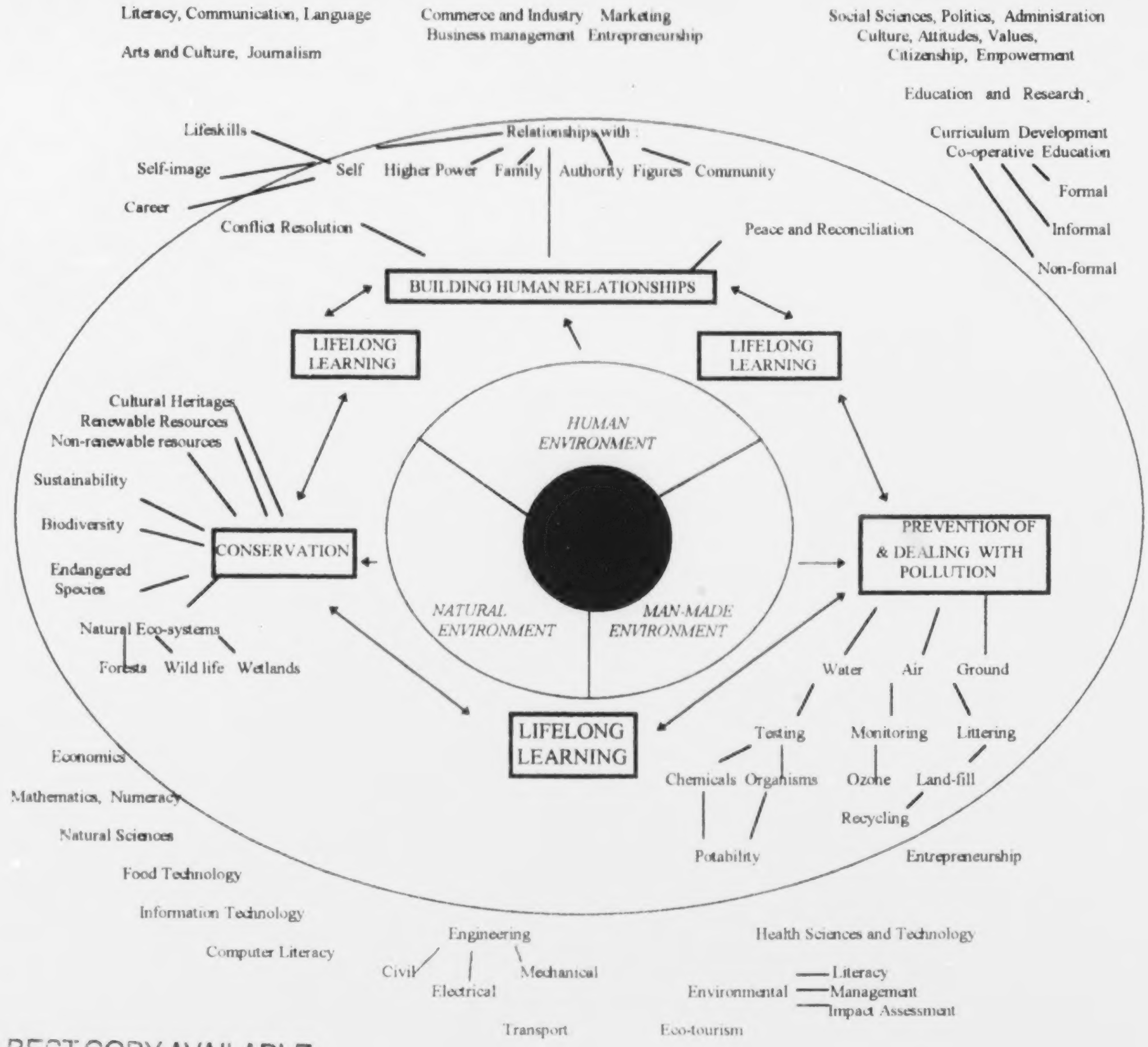
# Annexure A: CONCEPTUAL MODEL OF THE INTEGRATION OF ENVIRONMENTAL EDUCATION ACCROSS THE CURRICULEM


Literacy, Communication, Language
Arts and Culture, Journalism
Commerce and Industry
Marketing
Business management
Entrepreneurship
Social Sciences, Politics, Administration
Culture, Attitudes, Values,
Citizenship, Empowerment
Education and Research
Curriculum Development
Co-operative Education
Formal
Informal
Non-formal
Lifeskills
Self-image
Career
Self
Relationships with :
Higher Power
Family
Authority Figures
Community
Conflict Resolution
Peace and Reconciliation
BUILDING HUMAN RELATIONSHIPS
LIFELONG LEARNING
LIFELONG LEARNING
HUMAN ENVIRONMENT
NATURAL ENVIRONMENT
MAN-MADE ENVIRONMENT
Cultural Heritages
Renewable Resources
Non-renewable resources
Sustainability
Biodiversity
Endangered Species
CONSERVATION
Natural Eco-systems
Forests
Wild life
Wetlands
PREVENTION OF & DEALING WITH POLLUTION
Water
Air
Ground
Testing
Monitoring
Littering
Chemicals
Organisms
Ozone
Land-fill
Recycling
Potability
Entrepreneurship
LIFELONG LEARNING
Economics
Mathematics, Numeracy
Natural Sciences
Food Technology
Information Technology
Computer Literacy
Engineering
Civil
Electrical
Mechanical
Transport
Eco-tourism
Health Sciences and Technology
Environmental
Literacy
Management
Impact Assessment

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# Third world South African scholars: social and environmental problems in the nineties

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## Introduction -

At the beginning of 1997 I conducted a survey amongst the registered student group for a course entitled 'Primary Education Diploma'. The subject concerned is *Education* and the course is aimed at improving the qualification of Black teachers teaching at senior primary school level. (Copy of survey attached).

The survey's main aim was to establish the study needs of the student group; but also to enquire about problem areas in teaching. The majority of students (all of them teachers), indicated the following:

- they need training to assist the abused child in the classroom
- they need resources to educate parents to assist their children whom have been molested and raped

It became clear to me that social and economic factors in South Africa contribute towards a negative influence on the environmental situation of Black South African scholars. The situation, as it manifests itself at the moment in many Black South African schools, negates all efforts to uplift scholars still facing a third world environment.

A dire need exists to train pupils, teachers **and** parents to handle the subject of **Teenage Sexuality** in South Africa. Peter Scales, a sociologist in Colorado suggested in the eighties that "Educators, and parents as well, appear to believe that the challenges of contemporary life are too great for moral absolutes to be a child's only guidepost for behaviour ....."

## Social and Environmental trends in contemporary South African school situations -

Child abuse has become a direct result of general crime and unemployment situations in South Africa. The lack of stringent regulations to identify and rectify the problem, will have tragic results for South African scholars in years to come; especially for those who find themselves in third world situations.

The unemployment situation in South Africa results in parents (especially urban black families) who fall on hard times, being tempted to turn a blind eye to their daughters' activities. This situation could spell the difference between survival and going hungry. (Smailes P and Cunningham P). To allow their children to be abused in return for a percentage of their economically active children's wages can mean "a significant difference in quality of life". (Smailes P and Cunningham P).

We are consequently faced with the following:

- Ignorance on the part of parents, of the real influence of such matters on the future of such abused children
- An unwillingness and often a resistance by many parents to be addressed on matters concerning child abuse; the issue of sex education (for parents and/or children) is an aspect of life which they would rather not be confronted with
- Black teachers (many of whom are confused or immature in their own sexuality) are most of the time not suited as a unitary conveyor (neither as a therapist) of sexually relation information (Smailes and Cunningham)
- The statistics confronting the South African population of increased aids cases, is alarming especially if one reviews the situation amongst Black teenagers.

**Problems faced by third world South African scholars -**

A high percentage of third world South African scholars are therefore faced today with the problem of being socially and physically abused.. It has become a **social disorder** and a **cry** for help.

- Sexual abuse firstly affects the child so negatively that one has to consider involving outside parties to recognise the problem and ultimately work progressively together to support such a child towards a reformed life. Parents are however in most cases reluctant to report such abuse; teachers are not trained to recognise the negative behaviour of abused children; teachers are also most of the time unable to handle a situation of child abuse (even when they are aware of such happenings taking place). Children are not trained to report or discuss their problem with anybody and feel most of the time that to keep quiet is the ultimate answer to their problem.

- Secondly, rape, another serious and violent crime, involves even a greater portion of "emotional trauma for the survivor" (SALUS, vol 18 no 1). Acquaintance rape also happens to a high percentage of young school girls and is far more common than many people think. A significant number of (girls) who are sexually assaulted by an acquaintance do **not** report the crime.

Thirdly, arguments existing against sex education prohibit the progress which can be made by training parties who are faced with or confronting the trauma surrounding child abuse. Two most common arguments against sex education are that -

- "sex education undermines the family" and
- "it causes children to 'experiment' sexually (Scales P)

Fourthly, "many people wonder how anyone could be so uncivilized as to push graphic sex information on youngsters". "After all, the conventional parental wisdom is that you don't teach or show a child something frightening before he or she can emotionally understand it. I f you do, the child may well develop a traumatized view of it, characterized by either disgust or fixation." (US Department of Education)

Another problem appears in that disbelief that the HIV/AIDS epidemic is increasing and gaining ground, while sexual abuse continues to take place. These affected children not only need training on how to report their problem, but also how to recognise the basic symptoms of STD's, HIV/AIDS.

Lastly, Traditional Healers* can work in "conjunction with Western medical professionals" to prevent HIV/AIDS. They have been trained by the Department of Health and other Non-Governmental Organisations. (SALUS, vol 17 no 5). A misconception however exists that Traditional Healers do more harm than good. A majority of people do not realise that these Healers are from the 'community' and are well known, accepted and trusted by the 'community'. A channel for information dissemination in terms of STD's, HIV/AIDS epidemic prevention could well be formed by using these Healers' participation.

(* Native medicine men and women who utilize basic traditional medicines and spiritual principles in effecting cures - SALUS, vol17 no 5, p7)

**The necessity to educate teachers and environmentalists -**

*An in-depth study has to be undertaken to analyse the problem of sexual child abuse*

The Religious Aids Project (Rap) is presently working on a project in the Gauteng province to establish and identify the situation regarding the number of HIV-affected candidates. The Department of Health has a great number of statistics available concerning the alarming increase in HIV/AIDS candidates and the possible origin of the prevalent diseases.

*Educationists and environmentalists (including parents) need to be trained to assist the abused child on its way to reformation*

SOCIETY cannot remain complacent; immediate positive action needs to be taken by providing a holistic sex education programme. Sexual disease and teenage pregnancy rates are sky-rocketing - and our children are at risk. (Smailes P and Cunningham P)

The role of the TEACHER as sexuality educator has become imperative. Research has shown that parents are neglecting the sexuality education of their children. The teachers should support the parents in this regard and equip themselves to assist pupils with problems and to answer questions that pupils might have. Teachers can be instrumental in identifying children with problems (ie victims of sexual abuse). The teacher is the child's role model and identification figure with regard to his/her sexual role. (READER: compiler Edwards D, pp22b-24).

PARENTS are ultimately "in the best position to help a child make wise choices" (SALUS, vol 18 no 1) in life regarding sexuality and problems he might experience in respect of sexual abuse. No one is in a better position than the parent to help his child to make wise choices in this personal area and to encourage the child's confidence in order to channel trauma experienced in the case of abuse and/or rape.

RESEARCH METHODS have to be developed to introduce preventative measures to save the child from the trauma of abuse and rape. Government Acts should consider stricter regulations to deal with those who make themselves guilty of abusing children sexually.

## CONCLUSION

The **aims** of school sex education for teachers and consequently for pupils should seriously be considered in the light of the fact that currently (parents) and adolescents feel strongly that schools should provide sex education (Cambridge Journal of Education, vol23,no 2, 1993, p125).

**Values** in education should be: "Our Goal should be the Best" (Educational Horizons, Spring 1994, pp136-137). "Homework and tomorrow's spelling test are no longer the top concerns of many teens", refer to Tom Minnery's statement (in Educational Horizons, Spring 1994).

To make the BEST OF BOTH WORLD'S, I want to recommend that we do every bit to assist our third world South African school children who live in fear of tomorrow. Let us consider Sexuality Education to children, parents and teachers and make our society aware of the immense task and role which we as educators need to play in this field.

***Suggested discussion: Module 471, Sexuality Education, a course compiled by Dr Darleen Edwards. Dr Edwards is a senior lecturer in the Department of Postgraduate Education in the Department of Education, Vista University (Mamelodi Campus).***

*Acknowledgement: Information used to prepare this paper was obtained from the READER prepared by Dr D Edwards, as specified in the References column. Gratitude and thanks are herewith conveyed to her.*

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# Effective Environmental Strategies for sustainable Development.

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## Introduction:

Global environmental problems have been causing many threats to the global biodiversity. Global Biodiversity means the contractions of the words biological diversity. It refers to the variety of living word. It is synonym to the life on the earth . Unwse use of these biodiverse species leads to extinction of the the species on which human life depends. Balance, growth of human society depends on balance in biodiversity. the effective environmental education is the solution to maintain balance in biodiversity and finding solutions towards environmental problems. globalization and Privitization. It has apportuned new areas of investment. Technologies for sustainable development. At the same time it has created a cut throat competition, and threats to degradation of socio-cultural and political, economic and environmental ethics, required for balance environment and development.

On the backup of changing scenario of new economic policy effective evniconmental education should be a key factor to sustainable development through balanced use of world resources by protecting and preserving biodiversity. Environment education system is rested on unep Global unesco definition of environment education viz. " a pernament process in which individuals gain awareness of thier environment and acquire the knowledge, values skills, experiences, and also the determination which willenable them to act individually and collectively to solve present and future ,environmental problems.

If one goes through study of global environmental educational lacuna's one may find that there is a need for renewal of environmental educational strategies. The sowt analysis(Strength, Weaknesses, oppurtunities Threats) of environmental education in the world today at primary, secondary, schools, colleges, universities to make if more effective innovative environmental educational strategies may reformed byconsidering the following points:-

Worlds environmental pronlems range from degradation biotic and abiotic environmental resources . sustainable development in the world today is caught in dichotomy of environmental balance and development of industry, trade, Agricultural sectors of every countries economy.

Therefore environmental educational strategies need to took beyond only creating awareness about also for creating environmental balance. Every country's value system is based on concepts, laws of religion, culture, social systems and needs of specific target group of people in that area. for an example in India in Asia, . cultural values are so varies that they are different on every nest two hundred Kilometers area. It's therefore appropriate that the environmental eductional strategies should be based on local ethicaly socio-cultural, economic, polictical, psychological needs of developmets and developing countries.

Ethical value also vary from cultural taboo's, culture and religion encompass the living style of the people. Environmental Educational strategy should be oriented with ethical values of indegenous people.

Specially in the country like India wood cutting in necessary fro the people below peverty line people. Seventy pervent of the world's hungry people live in Asia-pacific region. Twenty percent of developing worlds populations remain undernourished . Twenty percent of the world's population live on the equivalent a dollar per day. Over 120 million people are officially unemployed. to solve these problems Env, Ed. should follow situation oriented problems solving approach transmitting

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positive messages about what inidivduals and groups of the people can do to tackle their environmental problems. Environmental educational strategies and actions should be reflected peoples of the country for which a particular should be reflected peoples of the country for which a particular strategy is formulated Environmental Economics , and environement mangement seems to be the need of plinary science of education. there should be a closer link between science of education and environmental Managenment.

Environmental Education and Environmental Management :- are mutually reinforcing support both of offical bodies and of population for which the educational strategy is developed. Is constitutes both a precondition and a tool for effective environmental management.

Pluralism seems fact desirable in Environmental education:-

In developing countries pluralism in religion , traditions, values ethics is so intact that an uniform En. Educations strategy may not be effective to variuos target groups. Therefore multi-dimensional, pluralistic educational strategy be evolved for various targets groups.

Environmental Educational strategies must be an integral part of environmental action plans:- Environmental protection training and education is imparted to the masses. It should infact be inclueded in aciton plans. viz: Health training and awareness programmes should go togethere. The policy makers, administrators and trainners, implementors of educational strategies must be an integral parts of such strategies.

Environmental Education should be effective so as to change the attitudes and skills effectively for sustainable development :- In many industries, schools, universities, social and political organisations, environmental education is apart and parcel of H.R.D. Programmes. But it has been observed that after having imparted H.R.D Trainnings trainees do not show any affitunal change. Therefore evaluation of such programmes and trainnings seems crucial for sustainable development.

- Cost and Benefit ratio analysis fo E - Education is necessary.
:- A large amount of money is spent on Environmental Education . Manypeople participate in it. but from the attidunal change point of vies . effect is very megre. therefore systems. strategies of imparting Environmental Educational needs to be overhauled.

More balanced interlia Environmental Educational policies be formulated between:- Environmental Educational strategies may not be uniformally effective for developed and developing countries. Because environmental and developmental problems and solutions are different in both the worlds.therefore balanced environmental educational strategies for both the countires should be formulated.

Target groups especially indeveloping countries should be aware with effective systems and methods fo various medias.:- Media's are very effective for awareness and sustainablility. It has tremendous power to create right kind of environment for learing and attitudnal change process. It is also crucial to educate press and various levels of media management about environmental education.

Attitudnal change amongst Politicians and Administrations :- It has been observed in many countreis that the ideal values systems are degraded due to corrupt political systems and administration due to which implementation of environment education is not proper. Environmental ethics is endangered . Many un intenetioned men and moments voluntary agencies , devoted social worked should be involved by government to impart environmental education . It's necessary that political systems , administration should change their attitudes.

Effective Impact Analysis Systems :- Not only quantitative but also quantitative change impact due to environmental educational be evolved. Nonformal education should also be used as powerful instruments of effective enviromental education. Paulo frieree believed and expreinced that non formal educational elleviated many in Brazil from their down troddeness.

By taking these points into consideraton the environmental education in both the world will lead to sustainable development of developed and under developed worlds. Individuals, schools, colleges, voluntary agencies also can play an important role in evolving and implementing indegenous environmental strategies for preservation of bio diversity.

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Unesco/Unep; *International strategy for Action in the field of Environmental Education and Trainning.*

# Microscale water quality test kits: a bridge between the "Pre-modern" and "western" worlds for environmental educators?

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## INTRODUCTION

This paper describes the development and contents of a microscale water quality test system. This is the latest in a series of low cost water quality test kits which have been specifically designed for South African conditions. The microscale system aims to empower environmental educators (and other interested parties) by allowing them and their learners to test water for a broader range of pollutants (or indicators of pollution) in a more cost effective way than they have been able to previously. The system is also the first in South Africa which will allow them to interpret their results in a manner which is compatible with international water quality guidelines. A brief description of the manner in which the kits are being distributed as part of the 2020 Vision project of the Department of Water Affairs and Forestry (DWAF) is also given.

## HISTORY AND CONTEXT OF THE MICROSCALE WATER QUALITY TEST SYSTEM.

One of the symptoms of our present global environmental crisis is a tremendous decrease in waterquality. This decrease in water quality is common to both the "pre-modern" and "western" world", however, it tends to manifest itself in different ways. Decrease in water quality in the pre-modern world, especially in the cities is dominated by both point and non-point sources of pollution. Theseincludeindustrial effluent, inadequate sanitation and garbage disposal facilities (WHO, 1992). It as been estimated that 25 000 people in the "pre-modern" world die each day from water borne diseases such as typhoid, dysentery and gastro-enteritis (Mason, 1996).

In "western" countries, deaths due to "dirty" drinking and washing water have decreased considerably (WHO, 1992). However, decreased water quality has resulted in lifeless rivers which are an aesthetic eyesore and which are unsuitable for recreational purposes (Mason, 1996; Mitchell and Stapp, 1990). Common causes of decreased water quality in the "western" world are non-point sources of pollution such as urban and agricultural runoff. Pollution from point-sources in these countries has been minimised via effective treatment of effluent before it is returned to rivers (Mason, 1996, WHO 1992). Common point-sources of effluent include industries, sewers and storm water drains (Mason, 1996, WHO 1992)

Although South Africa is a mixture of both "western" and "pre-modern" worlds we face most of the water quality problems of a "pre-modern" world, 50% of the deaths of children between the age of one month and one year in rural areas are due to gastro- enteritis, and the mortality rate of children under 5 in these regions has been estimated at 12% (DWAF, 1994). Attempts are being made in urban areas to control pollution from point sources, however, sanitation facilities in informal settlements are still hopelessly inadequate and it is economically unfeasible in many cases to treat the effluent from industries and waste water treatment works to desired standards (van Veelen, 1996). In addition we are a semi- arid country that can ill afford to contaminate its water supplies. We are also a country where a vast proportion of the population cannot afford to pay the ever escalating price that will be required to purify ever more polluted river water to drinking water standards.

In response to the water quality problems in both the "pre-modern" and "western" worlds William Stapp and Mark Mitchell of Michigan State University founded GREEN (Global Rivers Environmental Education Network) to get youth involved in monitoring water quality and taking action to help resolve environmental problems (Mitchell & Stapp, 1990). In South Africa organisations such as Nature Conservation Services of KwaZulu /Natal, Umgeni Water, Rand Water, Delta Environmental Centre,

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the Wildlife and Environment Society of South Africa, and SWAP (School Water Action Project) tellenbosch became affiliated to GREEN and worked in partnerships to adapt the rather expensive American water quality monitoring kits to produce low cost water quality monitoring test kits adapted to local conditions. These kits are used widely at schools in the context of informal "after school" science or biology club type activities. In the meantime, in science education circles, in the "western" world of the United States of America microscale chemistry was born as an alternative to traditional methods of doing chemistry practical work (Hynd personal communication). Microscale chemistry was favoured because it uses lesser quantities of chemicals and has components which are usually made of reusable plastic. It is, therefore, cheaper and safer than traditional methods of doing chemistry practical work (Bradley et al. 1997a & b). Microscale chemistry has also become important because of a worldwide move towards a more student centred, constructivist, approach to science education (Fensham et al. 1994). Microchemistry, allows individual or groups of students to do science practical experiments for themselves instead of more traditional methods where the teacher tends to do science practicals as a demonstration (Bradley et al. 1997b).

In the mixed "western" and "pre-modern" world of South Africa microchemistry also promises to be a artial solution to our education crisis. We have many schools which lack resources and trained teachers. No science practical work is done in the majority of these schools (Lynch, 1994). In response to this problem the RADMASTE Centre of the University of Witwatersrand and Somerset Educational teamed up to create the Microchem TM system. The system includes chemicals, worksheets and microscale equipment kits (Figure 1). The idea is to help an inexperienced or untrained teacher to present high school chemistry experiments in a student centred manner without a science laboratory. Of course microcscale chemistry is equally applicable to those schools that do not lack resources due to the cost and educational benefits already mentioned.

In addition to high school chemistry, RADMASTE is also adapting the microchemistry system to perform biology food experiments, primary school science and high school physics (electricity, optics etc.). Currently the RADMASTE/Somerset Educational Microchem TM system is exported to several countries including the USA, UK, Australia, Egypt, and Cameroon.

Eventually, and perhaps inevitably, the organisations that had already produced low- cost water quality monitoring kits in South Africa joined forces with RADMASTE and Somerset Educational to produce a low cost microchemistry water quality monitoring system. Funding for the production of the system and its distribution to schools country wide was sourced from the 20-20 Vision project of DWAF (Department of Water Affairs and Forestry). This water quality monitoring system is described below.

## A DESCRIPTION OF THE MICROCHEMISTRY WATER QUALITY TESTING SYSTEM.

The microchemistry water quality testing system consists of three integrated parts. A water audit field book (produced by Sharenet), a MicrochemTM Field Kit, and a MicrochemTM water audit Microlab.

### 1. The Water Audit Field Book

The Water Audit Field Book contains no chemical tests and may be used completely independently of the MicrochemTM materials. The book includes instructions for simple activities and observations to help learners deduce what the quality of the water in a catchment area may be. Tests and activities in the book include a description of traditional measures used by Nguni people to assess water quality; interviews with local people in the catchment area to ascertain how the quality of the catchment area has changed through time; a catchment area survey where various parameters in the catchment area are evaluated to give an overall impression of catchment area quality; a river site survey (this includes looking at factors such as stream velocity and litter); studies of aquatic insect life; and determinations of the clarity of the water. The learners are asked to synthesize their impressions from the above tests nd activities to decide whether the river or stream is OK, NOT SO GOOD, or BAD, for human health and for aquatic ecosystem health.

No potentially hazardous chemicals are involved in any of the activities or tests so that they are specially suitable for younger learners. However, the activities are very open and may be carried out at various levels of sophistication by learners of all ages. The activities include a wide variety of skills and could be included in various traditional subject areas within a formal school curriculum. The subject areas of Geography, History and Biology spring readily to mind.

## 2. The MicrochemTM Field Kit.

This kit contains potentially hazardous chemical tests. It should, therefore, be used by learners in the presence of a properly qualified science teacher. This kit consists of non-quantitative "simple to do" tests which allow learners to test for the "presence or absence" of pollutants in water out in the field. Most of the tests produce a colour change if a pollutant or indicator of pollution is present. The tests require students to count drops of chemical reagent and sample- no accurate measurements are required.

Tests included in the kit are: total coliform bacteria, electrical conductivity, dissolved oxygen, nitrite, nitrate, orthophosphate, turbidity, and temperature difference. The test for total coliform bacteria is based on a commercially available test and takes advantage of the fact the total coliform bacteria are one of the few groups of bacteria which possess the enzyme - galactosidase. (APHA, 1995). In the test the sample water is mixed with a bacterial growth powder which contains a substrate for which - galactosidase is specific. When the total coliform bacteria metabolize this substrate they produce a yellow dye (ALPHA, 1995). The bacteria are incubated by means of body heat. Electrical conductivity is estimated by comparing the brightness of a LED in the water sample to the brightness of the LED in a known standard. Dissolved oxygen concentration is estimated via the use of dissolved oxygen tablets from Lamotte Company USA. The tests for nitrates, nitrites and orthophosphate are based on the tandard methods (APHA, 1995). Estimation of turbidity is achieved via the use of a modified "Secchi" disc.

Once the students have performed a particular test they are referred to simplified water quality guideline tables (see Table 1 for an example) to help them interpret their result. The water quality guidelines have been simplified from the guidelines made available by DWAF (DWAF, 1997). These guidelines have been modified from internationally available water quality guidelines to suit local conditions. The guidelines are technical documents which serve to help a person who has tested water for somesubstance or the other to decide for what purpose that water may be used. Clearly not all water may be used for all purposes. For example chlorinated water which is safe for drinking is unsuitable for aquatic life, and water which contains Escherichia coli and is unsuitable for drinking may be very suitable for aquatic life. DWAF has published water quality guidelines for domestic use, recreational use, industrial use, agricultural use (irrigation, lifestock watering and aquaculture), and aquatic ecosystems. Only the water quality guidelines for domestic use, recreational use and aquatic cosystems have been selected for the Field Kit as these are the most relevant to the world of the learners. The simplified guidelines enable the students to decide whether or not their water sample is "EXCELLENT", "OK", "NOT SO GOOD", "BAD" or "TERRIBLE?". The definitions of these terms are given in Table 2.

If the learners find that there are pollutants in the water that they have tested they are asked to repeat their results. If the results are still positive they are asked to confirm them using the more sophisticated Microlab tests or a professional water laboratory. Once the students have confirmed their results they should then locate the source of the pollution and take action to solve the problem if that is possible.

Instructions for the tests have been laid out in a reusable booklet in a pictorial manner to cater for learners whose first language is not English (Figure 2). In addition an information page describing the pollutant, its origins, and its affects is supplied for each test. Most of the water test reagents are contained in 3 ml plastic bulbous propettes (see Figure 1) which may be heat sealed or sealed with Prestick TM after use. The propettes contain enough reagents for 20 water tests.

The tests in the Field Kit involve the use of numerous manipulative skills and the tests themselves may be related to numerous aspects of the present South African school syllabus. Here the subjects of Physical Science and Biology spring most readily to mind. The tests are probably most suited to students in grade 7 and upwards.

### 3. The MicrochemTM Microlab

The Microchem TM Microlab is designed for use in the laboratory or classroom. It has tests which allow for the semi-quantitative determination of pollutants in a water sample. In addition to the tests for substances included in the Field Kit the Microlab includes a test for biological oxygen demand. Most of the tests also depend on a colour change reaction. However, the tests in the Microlab are more sophisticated than those in the Field Kit. For example the volumes of test reagent and water sample are measured using syringes. Also, the results obtained by testing a sample are compared to the results obtained by testing a standard of known concentration of the relevant pollutant. The concentration of the standards were determined by referral to the South African water quality guidelines (DWAF, 1996).

The test for microbiological water quality now allows for the detection of E. coli as well as total coliform bacteria. As with the Field Kit the water sample is mixed with a powder which only allows total coliform bacteria to grow. This tests makes use of the fact that E. coli are one of the few groups of bacteria which possess the enzyme - glucuronidase. This enzyme breaks down a specific substrate in the bacterial growth powder to produces a fluorescent dye (APHA, 1995). The dye may then be detected using a UV light. The bacteria are incubated by placing the sample in a box containing a light bulb. The temperature of the box is manipulated by opening or closing a flap on the box. The number of the bacteria is estimated by splitting the water sample into wells of different volumes, counting the number of positive and negative wells and comparing the results to a MPN (most probable number) table APHA, 1995).

The percentage saturation of the dissolved oxygen in the water is measured using the Winkler titration (APHA, 1995). Electrical conductivity is estimated using a low-cost bar LED conductivity meter. This meter has a row of LED's. The higher the electrical conductivity of a sample the greater the number of LED's that light up. The result obtained by estimating the electrical conductivity of a sample in this way can then be compared to the result obtained with a sample of known conductivity. The nitrite, nitrate and orthophosphate tests are similar to those in the MicrochemTM field kit, however the test for turbidity differs. The turbidity test works by comparing the turbidity of an unknown sample to a standard of known turbidity. A standard of known turbidity is created from the suspension of the precipitate which forms when solutions of known concentrations of barium chloride and sodium sulphate are mixed together.

Interpretation of the results is similar to that for the MicrochemTM Field Kit and an example of a water quality guideline for the Microlab is given in Table 1. The instructions for the tests follow a layout first designed by SWAP Stellenbosch. The instruction are laid out in pictorial form on re-usable folded cards. The cards are designed so that they stand up on a desk. Each card is termed a "workstation". The "workstations" have been designed specifically to cater for the needs of small groups of learners working together and to encourage cooperative learning between them. The students workstations are accompanied by a facilitator's manual which provides the background to all the water quality tests as ell as recipes for the various test reagents.

The majority of the water test reagents in the Microlab are supplied in 50 ml sealed bottles, enough for at least 100 water quality tests. The reagents used in the Microlab are the same s those in the Field Kit. It is, therefore, possible to "top up" Field Kit reagents from the Microlab.

The Microlab is designed to foster more advanced practical work skills amongst learners than the Field Kit. The tests themselves also, in general, require a more sophisticated understanding of scientific principles than do the tests in the field kit. The Microlab, is therefore, probably more suited to fulfill the needs of learners in the further education and training band of the National Qualification Framework (Grades 10 - 12).

### DISTRIBUTION OF THE MICROCHEMISTRY WATER QUALITY SYSTEM TO SCHOOLS VIA THE 2020 VISION CAMPAIGN.

The MicrochemTM water quality system is manufactured and distributed to schools by Somerset Educational. The 2020 Vision project of the Department of Water Affairs and Forestry is providing funding for the distribution of 700 microchemistry water quality monitoring kits to schools nationwide.

The water quality monitoring kits will be distributed to the schools via the following "networking scheme". Approximately 100 schools will receive the Microlab and 6 Field Kits. These schools will then be required to distribute the Field Kits to five schools in their area. The "minilab" schools will be required to support the field kit schools as they use the Field Kits. This support may include refilling chemicals for a field kit school which has used up its chemical supply, confirming results obtained by a "field kit" school and e-mailing the results obtained by a field kit school to a central point. It is hoped that this network system will allow more "developed" schools to assist less "developed" schools. This networking system is an example of the way in which environmental educators in the "western" world could coordinate their activities with environmental educators in the "pre-modern" world.

The point that has been chosen to receive all the results from the Field Kits is Delta Environmental Centre in Johannesburg. Results are displayed as symbols for "Human Health" and "Ecosystem Health" on a large catchment map for the country. Colours are used to indicate water quality (red = bad, orange = not so good, and green = OK).

Progress that the schools are making with their water quality surveys is being publicised at monthly interviews on SABC's television program 50/50 and M Net's KTV. In order to provide extra interest for the project selected schools involved in the campaign will be visited by the GREEN (Global Rivers Environmental Network) bike. This is a fold up bicycle which has a portable computer, a GPS (global positioning system), a cell phone, and a Microchem TM Field Kit. The idea is that it will be possible to use the GREEN bike to ride to a site on a river, use the GPS to ascertain the position of the site, test the water with the Field Kit, fill the results in on the portable computer, and e-mail the results via the cell phone to Delta Environmental Centre. The bicycles and other components have been donated by private companies. In addition a few GREEN bikes will be distributed among the schools for their own use. The GREEN bike campaign will hopefully also increase awareness of the latest communications technology such as GPS, computers, e- mail, and cell phones.

Schools will also be able to display the results of their water quality monitoring on an Internet site hosted by the Water Research Commission. It is hoped that it will eventually be possible to link this site to an Internet map server so that the schools with Internet facilities will be able to analyse their results using GIS (Geographical Information System) technology.

## PLANS FOR THE FUTURE WITH THE MICROCHEMISTRY WATER QUALITY TEST SYSTEM

### The present edition of the Microchem

TM water quality test system is only a development edition. A final edition will be prepared after the kits have been extensively trialed in the schools.

It is also hoped that the kits and materials accompanying the kits will be modified so that they can fulfill the needs of teachers within the new South African "outcomes based curriculum". Plans are also afoot to modify the tests so that they can be applied to resolve problems of community health, as well as test for the quality of ground water and tap water.

## CONCLUSION & SUMMARY

Polluted water is a problem which is common to both the "western" and "pre-modern" worlds. Low cost microscale science practical equipment which encourages student centred learning is equally applicable to education in both the "western" and "pre- modern" worlds. A low cost water quality monitoring system such as the Microchem TM system, will therefore, be of benefit to environmental educators in both worlds. This system allows testing for a wider range of pollutants or indicators of pollution in a more cost effective way than existing quality test kits (to the knowledge of the author). The system consists of 3 components which may be used in an integrated way. These are the Water Audit Field Book, the Microchem TM Field Kit, and the MicrochemTM Microlab. The Water Audit Field Book consists of simple observational tests, the Field Kit of simple, presence/absence water quality tests and the Microlab of more sophisticated semi-quantitative water quality tests. The water quality system is, therefore, applicable to learners of a wide range of abilities. The tests included within the system cover a variety of topics which may be related to many different aspects of the school curriculum. The manner in which the system applies Physical Science, Biology, Geography and History to detecting "real life" environmental problems also makes it an ideal tool for bringing formal school lessons to life.

## ACKNOWLEDGEMENTS

Funding for the development and distribution of the Microchem TM Water Quality System was obtained from the 2020 Vision project of the Department of Water Affairs and Forestry. Editing of this paper was by Professor John Bradley and Dr Rob O' Donoghue kindly allowed his GREEN bike project to be described here. Many thanks also to all the members of the SWAP Consortium, the Water QualityInstitute of DWAF, CYDNA laboratories, BKS Engineering, Somerset Education and RADMASTE Centre who contributed to the development of the Microchem TM water quality system.

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Table 1. A comparison between the water quality guidelines for the test for dissolved oxygen used in the Field Kit and the Microlab

a. Simplified water quality guidelines taken from the Microchem TM Field Kit.

| Concentration of dissolved oxygen | Effect on the plants and animals. |
|---|---|
| high | EXCELLENT- OK |
| medium to low | PROBLEM? |

b. Slightly more sophisticated water quality guidelines taken from the Microchem ™ Microlab

| % Saturation of dissolved oxygen | Effect on the plants and animals. |
|---|---|
| 80-120 % | This water is good for all species of aquatic animals and plants.<br>EXCELLENT |
| 60-79% | Some sensitive organisms will not be found in this water.<br>OK |
| 40-59% | Only a few tough species of animals and plants will live in this water<br>NOT SO GOOD |
| 20-39% | Most species of aquatic animals and plant die in water like this.<br>BAD |
| 0-19% | Almost all aquatic animals and plants will die in water like this.<br>TERRIBLE |

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Table 2. Interpretation of the terms "EXCELLENT, OK, NOT SO GOOD, BAD and TERRIBLE" used in the simplified water quality guidelines.

| | Water quality result | | What action should be taken? |
|---|---|---|---|
| | | **For plants and animals living in the water. (aquatic ecosystems only)** | |
| EXCELLENT<br>*(Ideal)* | This water is ideal | **Very sensitive** aquatic animals and plants can be found living in this water. | No action. |
| OK<br>*(Acceptable)* | This water is very good, but it still isn't ideal. For example it might not look or smell good but it could still be fine to use. | **Sensitive** aquatic animals and plants can be found living in this water. | The water should be checked regularly to see that it isn't getting any worse. |
| NOT SO GOOD<br>*(Tolerable)* | If this water is used for a long time (about seven years) it might cause problems. This water should only be used in an emergency. It would be better if this water was treated before use. | Only **tough** aquatic animals and plants can be found living in this water. | If the source of pollution can be fixed cheaply and easily then it should be fixed immediately. If the problem is a big one which is difficult to fix then a long term plan should be made to solve the problem. |
| BAD<br>*(unacceptable for use)* | This water could cause problems for sensitive users even if they only used it for a short period of time. | Only **very tough** animals and plants can be found in this water. | The source of pollution should be fixed as soon as possible |
| TERRIBLE<br>*(completely unfit for use)* | This water would cause problems for most users even if it is only used for a short period of time. | Very little life would be found in this water. | This is a crisis. The source of pollution should be fixed immediately. |

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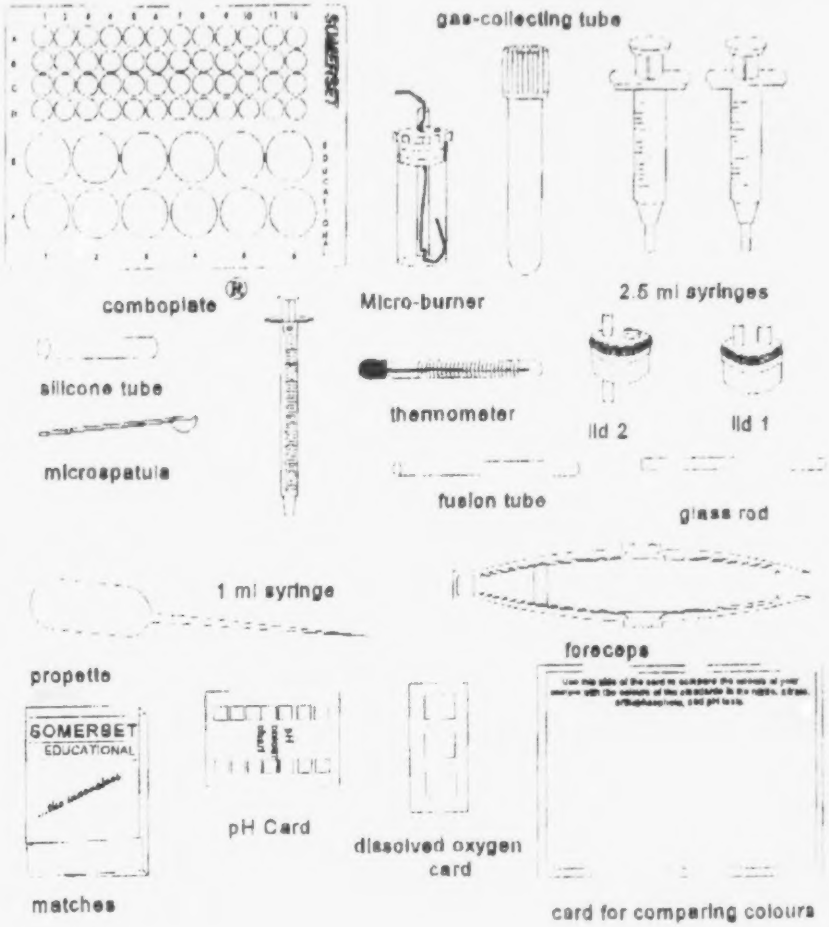
Figure 1. The parts of a Microchem ™ water quality equipment kit.


gas-collecting tube
SOMERSET
combopiate ®
Micro-burner
2.5 ml syringes
silicone tube
thermometer
lid 2
lid 1
microspatula
fusion tube
glass rod
1 ml syringe
forceps
propette
SOMERSET
EDUCATIONAL
pH Card
dissolved oxygen card
matches
card for comparing colours

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## Outcomes and Indicators of a Successful Environmental Education Program

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George Wingate's (US Bureau of Land Management) definition of "watershed" is applicable to a systems approach to education. A watershed is more than the physical landscape that is defined by its ridges with one outlet for water to flow. Watershed supports a variety of resources, uses, activities and values, where everything there is linked in such a way that eventually all things are affected by everything else in the watershed. Perhaps, more importantly, a watershed contains the history of all that went before and the spirit of those who touched it remains. Education is more than physical buildings, programs and classes. It is supported by a variety of resources, uses, activities and values, where everything is linked in such a way that eventually all things are affected by everything else in the system. It most definitely contains a history of all that went before, the spirit of those who touch it even today, and in addition, is filled with the promise of all that is to come. There are lots of problems facing educators today. One could just give up, and let the system go down the drain. On the other hand, if we want effective, literate communicators, powerful thinkers, responsible citizens and self-confident individuals, we will value education enough to try to improve it. You know the worth of water when the well runs dry.

Two small fish in this pond of reform are partnerships between education and business and educational outreach programs developed by business for students. Can we develop successful business partnerships to prepare students to be fully participating members of society, ready for the challenges of the 21st century? Water seeks its own level. And what are the necessary features of educational outreach programs developed by business so that they complement and enhance the regular programs?

In the cultures of successful partnerships, the participating businesses and schools include such characteristics as collegiality, willingness to explore new techniques, high expectations, trust and confidence, financial support, use of research, time for appreciation and recognition, clarity of goals and outcomes, clear priorities, and open and honest communication. Business work experiences are valuable. Educators' abilities to transmit knowledge and communicate with various age levels are key. Coordinating and capitalizing on expertise and talents, educators and business have the potential to provide a myriad of experiences and learning opportunities to enable students to meet the demands of the 21st century. It takes five years to build effective programs. That's a lot of water under the bridge. Beginning steps will include gaining a full understanding of the roles and responsibilities of business and sharing this with educators.

Many people and many jobs work together at the water district to provide high quality water at the wholesale level in sufficient quantity for beneficial uses by the county's lands and population and to manage flood and storm waters, thereby providing for public safety and the protection of property and natural resources. This year, the water district sponsored a full day of teacher in service, including two hours of shadowing, as a vehicle for developing an understanding of skills needed in today's workplace. Teachers toured the district's permits, mapping, hydrology and accounting offices before pairing up with a conservationist, chemist, engineer and other district employees for a first hand look at work performed by the water district. A quote from an administrator sums up the impact of the day: "I admit I was rather sceptical of the value of one-day industry field trips for systemic reform in the system. I am no longer sceptical. Teachers walked away that day with new ideas that they could use the very next day in class -- ideas that will help prepare our students to be productive and skilled employees.

In addition to developing school partnerships, the water district provides a

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school-based, water education program throughout Santa Clara County, preK through college, with an emphasis on K-12. Measures taken to accomplish this include public awareness research, outreach to five thousand students through classroom presentations, puppet plays, and tours of district facilities, training of two hundred teachers, creation or maintenance of five partnerships with schools and other agencies in the county, participation in at least five special events, production of four external publications and distribution of ten thousand publications. Developing a quality outreach program, not a watered down version, has contributed to its popularity.

Business and school partnerships exist in uncharted waters. Review of educational frameworks will contribute to the timeliness of business outreach presentations. The more you explore the less you feel like a fish out of water! Strategies to quality presentations include:

- prioritizing key concepts,
- defining desired behaviors (rubrics),
- emphasizing hands-on, meaningful tasks integrating Gardner's seven intelligences which include linguistic, logical-mathematical, spatial, bodily-kinesthetic, musical, interpersonal, intrapersonal (see his book, "Frames of Mind"),
- allowing students to construct their own meaning,
- creating a diversity sensitive environment,
- demonstrating appreciation for every learner's contribution, and "providing assessment that is timely, useful and that measures essential traits.

Choices for content in water district presentations favors the above strategies and includes development of songs to teach about the watershed (Guadalupe Watershed) and water cycle (Water Cycle Boogie), activities to teach the history and geography of Santa Clara County, games (The WaterWalk Game) to teach concepts, and hands on water experiments to actively involve all the learners. The best way to understand is to participate. Get your feet wet! Students' responses contribute to feelings of success:

- I liked putting in all the weird things that made the water look disgusting. Stacey
- I learned a new song. Katy
- I will teach my kids the same things you told me. Bryan
- I learned a lot of stuff from you. Anthony
- I hope you can come see us again. Rachelle
- I learned a lot about pollution. Sheena
- I never knew the word transpiration. It means plants release water molecules into the air. I know you know that, but I just wanted you to know that I knew it. Travis

Powerful learning can occur in these special presentations. You can lead a horse to water, but you can't make him drink! If schools and business work together, the power of the experience can extend beyond everyone's expectations.

"...A well developed mind, a passion to learn, and the ability to put knowledge to work are the new keys to the future of our young people, the success of our businesses, and the economic well-being of the nation." ("What Work Requires of Schools: A SCANS Report for America 2000," Executive Summary U.S. Department of Labor, June, 1991) Sometimes we feel we don't have much of an effect or influence, much like a single drop of water. Remember, drops of water stick together to make big clouds or large puddles. Just like the drops sticking together, sharing ideas can make things happen. What is incredible about water, is that the more you add, the bigger the pool gets. Education needs a flood of new ideas to recreate the system. American anthropologist Ralph Linton is quoted in Anthropology for the Nineties, "The last thing a fish would ever notice would be the water." It is difficult in our day-to-day living to see the potential of working together, but careful reflection on the system will help create the necessary climate for change.

The Internet must certainly be included in the development of relations between business and education. Class presentations can be reinvented using the myriad of tools available on the net to broaden the scope of possibilities for learning. Educators and students will quickly recognize the relevancy of computer education through their contacts with business. Networking with agencies throughout a region can also bring additional benefits. Agencies throughout Santa Clara County, recently joined forces to produce an annual environmental education fair (REEF) for teachers and a resource guide including all programs available to teachers in the region. As a result of this close association, agencies are working together to raise funding for community action programs and supporting each other's outreach efforts. This year's fair will be broadened to include a ten-hour, for credit class for teachers on water and other environmental issues. "The wise leader is like water. Consider water: water cleanses and refreshes all creatures without distinction and without judgment; water freely and fearlessly goes deep beneath the surface of things; water is fluid and responsive; water follows the law freely." (John Heider, The Tao of Leadership, 1985, p.15) We all need to be as fluid as possible to meet the challenges of educating the next generation. Then, together we can strategize to make a difference.

# The conflict between conservation and basic human needs

**F.W. Matjokana**

## INTRODUCTION

The conflict existing between conservation and basic human needs is caused by different value systems and it is therefore difficult to agree on a single vision of the role the environment plays in our lives. However, a shared vision should be sought. A vision that will reflect what all South Africans would like the South African environment to look now and in future. The following could be included to address the conflicting areas:

1. Harmonious marriage between conservation and sustainable use of resources for basic human needs.
2. Conserving the biological diversity, natural ecosystems and the diverse cultural heritage without undermining the indigenous knowledge and culture of the disempowered rural communities for now and future generations.
3. An equitable share in the environment and its natural resources for all citizens.

## WHAT TO CONSERVE

The total environment needs to be conserved for sustainable living, this includes:

The atmosphere, soil and the earth's crust, fresh and salt water above and below the around and in the sea. Radiation, noise and vibration affecting living organisms and all forms of life and their remains, things people have made and marked, all processes necessary for life, human culture and social systems both contemporary and historical, views about society's physical surrounding and quality of life and the changing nature of the environment.

Meanwhile conserving the natural diversity of living things, ecosystems and ecological processes as well as the natural beauty, sustainable management of renewable resources will need to be done in collaboration with communities, this includes: Equitable access to natural resources provided by environment; sustainable use of natural resources provided by the environment; alleviating poverty; creating suitable livelihood by using indigenous knowledge of nature or by supporting environmental management and promoting public awareness and understanding of environmental issues and calls for widespread environmental education and access to environmental information and dita, this will improve the quality of life of humans living environments including social, visual, natural and cultural dimensions. Conflict exists where the regulatory responsibilities, e.g. the government department playing dual role of promoting development of an industry and also protecting environmental resources used by that industry. The two roles conflict.

Finally, the root causes of the conflict between conservation and utilisation of natural resources are failure of the environmental regulatory institution to work together with communities, unsustainable levels of exploitation of natural resources, unequal access to natural resources, forced human migrations and overcrowding, damaged social structures and poor dispossessed people and uncontrolled development sectors.

## CONSERVATION OF OUR PLANT LIFE AND THE BASIC HUMAN NEEDS

Loss of woodland and forest cover in the rural Northern Province is severe. The urban growth (development), agricultural practices and tree cutting for fuel are the major causes. In 1997, the department of education (Provincial) and the Giyani Science Centre engaged schools in arbor week activities to gauge the environmental literacy level of pupils and teacher regarding conserving plant life. The result was that teachers and learners alike, did not know what Arbor week was and a need arose to

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where schools had to at least plant a tree, this was successfully done, schools participated in many ways on Arbor week 1997.

Some identified causes of loss of woodland has among others been monoculture in forestry and agriculture, mealies in the common crop planted year in and year out in the Northern Province, such practice does not conserve the soil. Poor management and poverty where communities have no alternative energy sources; overstocking lack of environmental information. In conserving woodland resource by way of providing adequate and affordable energy for all, and also move a more sustainable and environmentally friendly patterns of energy use we are faced by the reality that rural communities about two-thirds of the South African people by 1993 did not have access to electricity so that they used fuelwood for energy and heat and the percentage his dropped to ⅓ the total population by the mid 1997. The impact the rural communities have on woodland is still significant because wood is used for shelter and artistic works.

Development of towns and housing projects in the Northern Province leave our natural vegetation destroyed, bulldozers invade habitats of the disdiversity leaving animals, ranging from insects to big game threatened or even lulled, the example is the new high way between Pietersburg to Pretoria, much woodland has been destroyed.

Big portions of woodland has been converted to Agricultural land. The pressure put on the environment by the need for building materials as well as grazing by domestic animals.

## AN AWARENESS PROJECT FOR COMMUNITIES

In order to avoid some clashes with this rural communities environmental educators should adopt an approach which will enable them to understand that the local and global climates are altered through our actions. In a simple way, the communities need to be made aware that plants are a major store for carton which as taken up from the atmosphere and used to produce carbohydrates, fats and proteins which constitute a tree. When trees are burnt in veldfires or rot, the carbon is released as $CO_2$ contributing to the atmospheric $CO_2$ concentration. $CO_2$ contribute to the green house effect.

Secondly, communities should be made aware of the plant water retention capacity. Plants help prevent soil erosion, plants provide with protective cover of vegetation.

If we don't conserve the forest many of the species which depend on the forest for survival will become extinct. It is believed that 50% of the planet's species live in the forest. Lastly we need to educate our communities that desertification will occur when we destroy the forest for what ever reason.

## THE ROLE OF RELIGIONS IN CONSERVING RESOURCES

Religion, also play an important part in teaching about sustainable use of the environment. According to the Quran (7:129) claims that God bequeaths the earth to His servants as he pleaseth and continues to indicate on Quran 7:31 that people may eat and drink but need not waste by indulging in excess; because God does not approve of the intemperate.

According to Al-Habiz in Khalid and O'Brien (1192:11) man's freedom of choice is based on knowledge and intelligence puts on him an added responsibility of caring for the rest of God's creation and for those very resources of nature which help all kinds of life on earth to stay alive.

For example, Moslems do include conservation of resources in their teaching, 'hama' to them means that resources are conserved in that area and may not be tempered with.

According to Rojotte & Breuilly in Breuilly & Palmer (1992:3) indicate that the Christian church has spent enough time teaching people the way of thinking which has let the nations into ecological mess, they claim.

## ENVIRONMENTAL EDUCATION AS A SOLUTION TO THE CONFLICT

The constitution of the new South Africa enshrines the right of every citizen to a healthy environment. This includes people in Urban areas, townships, informal settlements and rural villages. All the United Nations conference on environment and development adopted that education is critical for sustainable development. RDP also advocates programmes to rekindle our people's love of the land to increase environmental consciousness amongst our youth, to coordinate environmental education policy at all levels and to empower communities to act on environmental issues and to promote and environmental ethic (RDP 1994, 3 8 - 4 1).

The White Paper on Education and Training states that environmental education involving an interdisciplinary, integrated and active approach to learning, must be vital element of all levels and programmes of the education and training system, in order to create environmentally literate and active citizens and ensure that all South Africans, present and future, enjoy a decent quality of life through the sustainable use of resources (White Paper, 1995:18).

The intentions should be translated into all programmes of learning for all phases and levels cross-curricularly. This can be contextualised through thematic-based, issue-based or topic- based in the Northern Province, for example, major environmental issues are water and plant resources depletion, such issues can be put aside and incorporated in the formal learning programmes.

## SCHOOL-BASED ENVIRONMENTAL EDUCATION PROJECTS

By educating children, we will have educated the nation. Distributing environmental issues such as Pollution and ecosystems and species destruction on such a scale that the biotic processes of organic regenation are under threat, learner should in the process realize that man will be the most affected since he is on top of the ladder of ecosystem. The scope of environmental education should include conservation, development, peace and democracy. In order to iron out the conflict that exists between environmentalists and consumers, environmental education will have to bring about peace, justice and sustainable living with cooperative meaning malang, action and change.

Active learning in environmental education will need practical hands on (encounter) openness where discussions are not limited by distrust and lack of generosity related to provision of information as well as reflecting in which a learner in free to express his thoughts.

Having said that, projects in which learners conduct simple action researches, community problem solving, simulation games, thematic teaching/learning, facts acquisition, field work and camp-outs, experiential, participating in rural appraisal, environmental epact assessment and learners should use their own immediate environment before proceeding to the neighbourhood and ultimately to the whole world.

Lastly, schools the enviro calender, e.g. on world water day, 22 March, schools may clean up a nearby stream or pick up litter in the streets and market places or hold posters with slogans on them; on the 5 world environmental day, environmental awareness programmes could be done where pupils audit their immediate environments; on 5 September on an Arbor day, learners could identify areas without cover, make an audit on plants around them, plant trees or a theme on the importance of plants to us and to the whole ecosystem. On a heritage day, 24 September, learners can trace products used in the past such as eating utensils and other historical household utilities.

## RURAL COMMUNITY-BASED ENVIRONMENTAL EDUCATION PROJECTS

Communities, irrespective of their level of literacy, can be taught on how to purify water, avoid cholera, food and prevention of contamination, disposal of water, recycling and reusing and on diarrhoea, dehydration and rehydration.

Infant mortality rate in the Northern Province is horrifying, the main causes are water and sanitation-related problems.

### Activity 1: Preventing gastro-enteriticis

The position of the latrines in the rural areas of Giyani and Duiwelskloof areas are not very far from homes, when asked why, communities say they were given very small piece of land. Burrying of the rubbish, boiling drinking water from rivers, springs and wells and advise communities not to empty their rubbish into rivers.

### Activity 2: Water purification

Let community members make a survey on the kind of water they use and what would they like their water look. Teach communities to construct and use sand filters to purify unsafe water for human consumption.

### Activity 3: Beware of cholera

Tip communities to use boiled, clean and treated water for consumption, wash hands before handling food, use toilets or far places from wells, rivers and streams and not the open field and so on.

### Conclusion

In order to avoid any conflict in attempting to preserve our resources and manage them well we need to consult widely for without concerted efforts at life long education for sustainability, the Northern Province and the whole South Africa will not be able to compete in the world market and equitable and adequate resource allocation will not succeed.

## APPROACHES AND STRATEGIES TO CREATE A BALANCE AND HARMONY BETWEEN CONSERVATION AND BASIC HUMAN NEEDS

### Water conservation and basic human needs

It will be essential for environmental educators to adopt an attitude which will among other, help them conduct surveys to investigate the level of knowledge and attitudes communities have towards conservation, given South Africa's past history of forced removal and other related resource distribution problems.

Needs identification such as the community's requirements for water supply and wood for shelter, energy and artistic activities. It is true that humans need water, sanitation and support services, and all these are provided by natural resources in our environment.

These services will have to be provided in a transparent, accountable, sustainable and equitable way so that trust exists between communities and environment educators.

An analysis of community issues is essential so that conservation is not done at the expense of meeting basic needs of communities. People must feel that they have access to decision making processes and the appropriateness brought about by the relationship between the people and the environment, which includes the level at which proposals are put to the people is also essential.

There needs to be a specific programme of empowerment and capacity building without undermining and ignoring the indigenous knowledge and skills communities have, inherited from the previous generation.

The most successful strategy of community-based projects is to have contracts with the communities and communities themselves need to drive the process of mobilising the resources of the community. Without first identifying community goals, values, processes and definitions of power with local relevance conservation will be received with scerptism. Environmental educators and other interested parties need to be able to tell apart between willingness to pay for services and ability to pay for services.

It is significant for communities to decide in an informal situation and then they will need to have access to information on the alternatives. Skills acquisitions is essential for creating sustainable living. Women will need to be involved either their traditional roles or in the development process.

## REPRESENTATIVE STRUCTURES

The make up of the committees and structures should include community member in the area in which environmental projects for environmental awareness. Thus, the make up of the structures need to reflect the local population.

## COMMUNITY INVOLVEMENT IN CONSERVATION OF RESOURCES

### Community needs

The consumption of resources as basic needs need to be understood. For the communities to meet their basic needs, empowerment. The achievement of appropriate change and equitable service is dependent on the initiation of action based on the realities of the recipient or client communities. Communities are widely heterogenous in terms of their needs. In the Northern Province, the North East and North South (Giyani area and Sekgosese, Ramokgopa rest of Botlokwa areas, water is a great crisis. The common problems identified are the existing capacity, the degree of cooperation between role players and the level of development. There is generally, a core of equivalence found within these communities regarding water supply, community members walk distances in search of water, or wait in long lines for hours in order to get water, while just nearby, a golf court is being watered. Communities need to be advice that if we use much water, we need to pay more for services, if we want to pay less, then we need to use water sustainably. Common problems in these areas are break-down in service delivery, lack of adequate water pressure and generally, poor water management. In this part of the Northern Province, water is needed for household use, Agriculture and animal husbandry.

Having acquired these strategies, community representatives will represent the interests of the community as a whole and this will enable the successful initiation of community-based project related to water conservation. It is at this stage that communities will be interested in forming the compacts at circuit areas and regional levels, e.g. steering committees.

### Addressing environmental problems

The common reason for soil erosion, air, water and soil pollution, malnutrition, diseases, overpopulation and others, are lack of land, space and resources.

Firstly, identify an environmental problem and include it in agendas during meeting with communities through structures. Secondly, it is essential to make sure that people have access to resources and land.

According to the white paper on a national water policy for South Africa, the distribution of water use shouldn't be racially biassed and access to water and the benefits from its use a privilege of those with access to land and political and economic power. The quality requires equitable access by all South Africans to, and benefit from the nations' water resources and an end to discrimination with regard to access to water on the basis of race, class or gender. A conflict exist here, the reconciliation between access to water and paying for services. Good water depends on sufficient funds to maintain equipment and purification of the resource as well as maintaining services.

In case where water is an environmental issue (this is evident in the Northern Province), how would one introduce water conservation while some parts of the Northern Province have enough drinking water and water for developing recreational areas such as parks in Pietersburg, Tzaneen and so on, while rural communities hardly have clean water for cooking, washing and drinking. On the one hand, the Bill of Rights gives all South Africans the right to an environment that is not harmful to their health or well-being, as well as the right tc have the environment protected for the benefit of present and future generations.

### How can we deal with water pollution?

According to the Bill of Rights, the government should make sure that water pollution is prevented. May be it is the duty of environmental awareness project which will be aimed at changing attitudes of humans towards the environment. Legislation has failed to make progress in this regard. If people are given education related to disposal methods and waste management skills, very important, all South Africans need enough space to live in and if resources are made available, people need to feel that they own the land and resources, that makes them responsible, degradation and the environment is no more the concerns of certain groups, but for all.

## Health as a major environmental issue and possible solutions

### A Health issues

According to the National Health plan for South Africa (ANC 1994:24) the South Africa government recognizes the interaction between health, environment and overall development and accepts that, for sustainable development, people are entitled to a healthy and productive life in harmony with nature. There is a sharp conflict in the Northern Province system where the curative health services are the traditional medicine and pharmaceutical, housing, water supply, sanitation, climate and hazardous waste are some of the environmental-related issues facing man and the rest of the ecosystem. Of course low level of education, unemployment and poverty often affect people's health negatively meanwhile urban development affects the environmental through pollution and overcrowding. Environmental educators alone cannot undo the problems presenting the conflict between conservation and basic human needs because all these health problems in South Africa, mostly in the Northern Province, have been inherited from the previous system of governess, political and economic state holders need to address these problems to pave ways for health for all.

According to the National Children's Rights Committee (NCRC 1994) the majority of South Africans who live in depressed rural areas or in overcrowded townships and informal settlements, the environment is one which is unsafe and unhealthy, is devoid of basic amenities and recreational facilities and where open spaces are filled with litter rather than trees and parks. These reflects the responsibility those who have political and economic power have.

The political and socio-economic changes in South Africa did not affect the health aspect of South Africans positively because unemployment causes an exodus of people moving to cities in search of job meanwhile accommodation for workers is not available, consequently informal settlements develop all over South Africa. Distribution of land for settlement appears to be a major problem. The results in health problems, obviously inadequate housing and lack of sanitation and water. More severe causes of environmental health is poverty. The disadvantaged are more vulnerable to diseases and have no or little access to health resources.

It is important to be able to distinguish between basic human needs and secondary human needs. According to Von Schirnding (1995), the urban poor in South Africa, being simultaneously exposed to a myriad of agents of environmental diseases, will suffer increasingly from the worst of both first and third worlds and being frequently nutritionally deprived, are the most vulnerable to the effects of these diseases. NCRC (1994) and Von Schirnding (1995) continues to indicate that the most important factors in the environment which contribute to diseases, disability and death in South Africa are lack of sewers, drains or services to disposal of solid and liquid wastes, it is estimated that about 50% of the population in South Africa lacks adequate sanitation, yet, environmental educators and other concerned groups engage South Africans in conservation of resources they don't have, this causes a conflict; lack of safe and sufficient water supply, overcrowded and inadequate living conditions; insufficient safe and clean fuels for domestic cooking and heating which means that expensive and unhealthy fuels are use, of course by those who can afford, and this energy sources cause pollution, on the one hand a conservationists needs people to realize that they need clean air, clean water and a clean environment. Alternatively energy sources were supposed to be made available to consumers.

About 60% of the household has no electricity, they depend on wood for heating and cooking in the household. According to the white paper "water supply and sanitation reflects the intension of the South African government to ensure that all South Africans have access to essential basic water supply and sanitation services at a cost which is affordable both to the household and the country as a whole. The impression geunied by citizens living in the rural areas is that water is conserved to those who can afford and are in urban areas and until they have a sense of ownership, participating in decision-making processes and their voice heard, much of what the government wishes to achieve may not be realized. The information of water committees in local structures of governess in the Giyani area is encouraging, this is the right way to go.

The fundamental issue to be addressed in the water sector is equity. The line that divides those with adequate water and those without the same line dividing the rich from the poor, the hungry and the well fed, race and privileged. This inequity also exists in health, education, housing and land ownership, consequently, sharp conflicts occur.

The definition of basic water supply as presented by the white paper on water supply and sanitation policy (1994:15) is that each citizen in South Africa is entitled to 25 litres per day, which would mean that at least 450 million litres for 30% of the population living in rural areas of South Africa. According to the white paper, the distance between a person is dwelling and where the carts the water should be 200 m. To date people in the Botlokwa area still travel from kilometres and wait for the lorry to supply them with water not less than two hours. Regular water supply cuts occur regularly in rural areas. Pit toilets were supposed to be replaced by water flushing toilets.

### B Striking the harmony between conservation and basic human needs

1. General community awareness on water and sanitation and related issues, including providing information packs and teaching aids to schools, e.g. water testing kits.
2. Training of local authorities and local water committees in the principles of democratic governance and public office, a basic understanding of water and public health, administrative skills and necessary technical skills.
3. Training of community support personnel. Creative solutions are required to produce a cadre of development support workers who are equipped with a balanced set of both community organisations skills and appropriate technical skills.
4. Training of specialized water care technicians and training professional and managerial staff.
5. Introduction of rural service subsidies because they are the worst serviced areas of the country.
6. It is important to acknowledge that rural communities also have both basic and secondary needs, one would imagine that when the basic needs are supplied, then secondary needs such as recreation aesthetic and artistic needs will be met too.
7. There is a need to address consumer resistance which often results in non-payment simply because the consumer community has not been involved in the development and policy-making process. In most cases such resistance occurs where services do not meet the expectations of the consumers.
8. Communities need to be taught that for them to get quality and high services, they must be prepared to pay higher rates and if they choose to pay lower rates, then they must be prepared to get a low quality service which are less sustainable.

9. Information must be accessed by communities that the time for free supplies of water in the former homelands such as Gazankulu, Venda, Lebowa has ended with the defunct homelands administrations and water services must be paid for.
10. Awareness programmes reflecting costs of water supply will inculcate a culture of payments for services to avoid interruption of services in some areas because of lack of maintenance funds.
11. Communities must be warned against unauthorized connections to the mains, in which case the water is not metered, consequently the consumption becomes high. In some vegetables and gardens and such practices affect consumers in high lying areas who are at the end of the distribution system often do not get any water because the system is caused to fail.
12. Governance needs to assume a context of universal human rights and the equity of all persons regardless of race, gender, creed of culture.
13. The development needs to be community driven by way of developing responsibilities to local structure, this presents the community with responsibility for their own development and governance.
14. Environmentalists and environmental educators should know that in conserving resources, they should keep in mind that basic services are a human right, thus, a right to a level of services adequate to provide a healthy environment and this implies that no individual or community should demand services on the expense of others.
15. More money needs to be allocated to the inadequately served communities.
16. The user principle needs to be inculcated to ensure sustainable equitable development and efficient management.
17. Environmental integrity, whereby the environment is protected in all development activities.
18. Any development should be demand driven, which mean there must be genuine motivation for development and the demand must have originated from the community, not from outside agencies or state on behalf of the community.
19. The local government needs to be given full powers to make provision for access by all persons residing within its area of jurisdiction to services such as water, sanitation, providing these services and amenities are rendered in an environmentally sustainable manner and are financially and physically practicable.

## CONCLUSION

Conservation and rational use of resources and basic human needs are two polarised issues.

A holistic goal needs to be a focal point in this regard, if communities don't pay for services, don't preserve resources, the support systems of ecosystems will collapse and for the first time man will know that he cannot eat money.

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# Community development the key to sustainable environmental education.

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*Environmental degradation is taking place at an alarming rate as a result of increasing pressure placed on the environment by expanding population numbers and a growing demand for natural resources. Environmental education is seen as an important tool to manage and reverse this process. The aim of environmental education is two-fold; to make people aware of the environment and the natural processes taking place in the environment and also to make people aware of the impact their actions have on the environment.*

*Environmental education has to take place at grass-roots level in order to have the maximum impact. For environmental education to be implemented at grass-roots level community development is seen as an important catalyst. The environmental educator together with the community identifies the specific community's environmental needs. Once these needs have been identified, a community project with an environmental flavour should be implemented. Through the successful implementation of this project the community is educated and empowered and will in future be able to implement further projects independently. This leaves the environmental educator free to initiate further projects. It may therefore be stated that the implementation of environmental education through community development is essential to make environmental education sustainable.*

*This paper will discuss both the process of implementing environmental education through community development as well as the successful implementation of various projects.*

## 1 INTRODUCTION

The importance of environmental education as a process for managing and reversing environmental degradation cannot be overemphasised. The aim of environmental education is two-fold; to make people aware of the environment and the natural processes taking place in the environment and to make people aware of the impact their actions have on the environment. For environmental education to have its greatest impact as many people as possible have to be reached by environmental educators.

Community development is considered to be a catalyst concept for environmental educators to reach grass-roots communities. Community development is also seen as a method whereby grass-roots communities can be made aware of their needs and solve their problems through attainable projects. Through this process communities are made aware of their environment and they are taught organisational skills, self-reliance, self-sufficiency and thereby regain human dignity. After the completion of a successful project the community is empowered to tackle further projects independently.

## 2 GENERAL COMMENTS ON COMMUNITY DEVELOPMENT

Community development is a means of helping the community to help itself. Community development addresses both concrete and abstract human needs. While striving to reach the concrete objectives, at the same time abstract objectives are reached (like self-reliance, self-sufficiency and human dignity).

Community development is a learning process for everyone involved in the process at a grass-roots level. The community identifies a need this need is then translated into an objective and through collective action community building takes place.

Not only do people gain in self-sufficiency, self-reliance and dignity, but they also learn how to organise more effectively and through this their leadership structures are developed or strengthened.

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One of the most important benefits for a community is that community development creates awareness. People become aware of themselves and their environment, of their needs and their resources.

## 3 THE COMMUNITY DEVELOPMENT PROCESS

The community development process will be discussed in this section. Before any community development project is tackled the first step is the identification of an action group in which the process and resulting project will be initiated.

The most important aspect of identifying an action group is that the action group should share a common outlook and concern. Various types of action groups exist, the most common of which are highlighted below.

- An **institution** can act as an action group, be it a school, church congregation, sports club or some other interest group.
- A **few institutions who have roughly the same interests** can come together to form an action group.
- A **legal entity** can act as an action group (for example, an area under the jurisdiction of one tribal authority or one specific ward in an urban area).
- A **geographical unit** can be taken as an action group depending on size (for example, a village in a rural area or a suburb in an urban area).
- An **ad hoc collection of concerned individuals** with a common need could be regarded as an action group for the purpose of community development (for example, the mothers of babies).

Once the action group has been identified the community development process is started.

The steps of the community development process are:

1. **Making contact** (survey and needs identified)
2. **Planning**
3. **Implementation**
4. **Evaluation**

These steps will now be discussed in greater detail.

### 3.1 Making Contact

The community worker must get to know the community and the community must get to know the community worker. Both the community and the community worker must be aware of the needs in the area.

The needs of the community can only be established after a survey of some kind has taken place. The survey may take place through questionnaires, interviews and conversation with groups and individuals, sampling and observations. These surveys are necessary to obtain absolute clarity on the needs that have to be addressed. The surveys will also help to establish what resources (human, natural, infrastructural and organisational) are available to tackle a certain need. Obstacles that have to be overcome are also identified. The survey will also indicate who and how many people will benefit. Local people have to be involved in the collection of data as they know the community and the community's history better than the community worker.

After the surveys have been completed the needs are identified. As the environmental educator is facilitating community development and acting as a community worker it is of utmost importance that a project with an environmental flavour is tackled.

A committee is then selected by the action group. This committee will co-ordinate and implement the project identified. No matter who the committee is it is always important to involve local leadership. It is also essential that this committee remains active and goal oriented.

### 3.2 Planning

*(This is one of the community workers most important tasks.)*

Planning brings together 3 elements namely needs, resources and objectives. Planning must take place on a step-by-step basis, so that objectives may be attained in a very short period in order to maintain and encourage enthusiasm. Long-term planning, although vague, must be included. This planning process must address:

- what action must take place
- when action must take place
- who will take action
- how action will take place

This must be recorded and evaluated in order to measure success.

### 3.3 Implementation

Implementation is not a matter for the community worker and the committee alone, the whole action group has to be involved. The community worker should try to remain in the background during implementation so that the community presumes that the success of the project is due to their efforts. Celebration is recommended as it strengthens relationships, it underlines the importance of the action group's achievements, it advertises to the world that the action group achieved something through it's own efforts. It is also a statement that the action group can stand on it's own feet.

### 3.4 Evaluation

Evaluation of community development projects is of critical importance as it facilitates the whole community project to be a learning experience. Three facets have to be evaluated:

- appropriateness
- feasibility
- effectiveness

The community worker/environmental educator also has to evaluate to what extent he/she has achieved the abstract goals of self-reliance, self-sufficiency, human dignity, organisational ability and the creation of positive attitudes.

It very often happens that the attainment of an objective leads to the identification of further needs. Apart from the confidence the community acquires, they also experience enthusiasm to tackle further problems. One successful project can and often does lead to various other projects. This leaves the community worker/environmental educator free to tackle a new project in a new community.

## 4 CASE STUDIES

### 4.1 Tamboville-Leeupan Project

**Problem statement:** Tamboville residents were polluting and degrading the Leeupan area.
**Aim:** To uplift the standard of living of the people and to make the local people aware of the international importance of Leeupan as a haven for migratory birds.
**Actions:** Clean-ups were organised, food gardens and gardens were established. Trees were also donated to the people of Tamboville. This project was completed in conjunction with Trees for Africa and South African Nature Foundation.
**Outcome:** The people are aware of Leeupan's conservation importance, pollution has been minimised, there is a marked increase in the bird population. The greening of the area has taken place and a gardening competition was also held by the community to encourage people to take pride in their living environment. Local youth conservation organisations were established to further environmental education. As a result of the community becoming more organised they were able to negotiate the provision of services with the local town council. Further projects were tackled independently such as the establishment of creches, sport and recreational facilities and a refuse removal system.

### 4.2 Wattville Project

**Problem statement:** The living environment was degraded.
**Aim:** To uplift and improve the living environments of the people of Wattville.
**Actions:** The Wattville Vukani Conservation Club was started. The members of this club were taken on a bushcamp and made environmentally aware. In collaboration with this club and other organisations the whole township was cleaned up with the assistance of the Town Council. The parks were also cleaned up and trees were donated to the Vukani Conservation Club and these trees were used by them to

upgrade parks. This project was done in association with ESKOM.
**Outcome:** The Wattville Vukani Conservation Club was instrumental in cleaning up their local environment and upgrading parks. The club was also partially responsible for the creation of the Greater Benoni Environmental Society. This Club is continually tackling new environmental projects like recycling and awareness projects.

### 4.3 Lack of environmental awareness at schools

**Problem statement:** The overall lack of environmental awareness at schools.
**Aim:** To make the pupils as well as the teachers environmentally aware and to initiate projects within the schools.
**Actions:** Environmental awareness lectures were held at the schools (pre-primary, primary and secondary). Both pupils and teachers were addressed.
**Outcome:** The teachers and pupils became aware of the environment. Trees were planted and gardens were established in the school yards. Vegetable gardens were also established in some cases. Recycling and fundraising projects were organised. Further environmental education projects are also continually organised.

## 5. CONCLUSION

It becomes evident that through community development, environmental educators can reach a large number of grass-roots communities with an environmental message. More important than this, however, is that these communities, once they have been led through a successful project, have the means to tackle further projects independently. It is within this context that community development is seen as the key to sustainable environmental education. This whole concept of integrating community development and environmental education is in line with one statement namely:

***DON'T JUST GIVE THE PEOPLE FISH, TEACH THEM TO CATCH FISH.***

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# Environmental aspects of concern in the Public Administration of South Africa

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## ABSTRACT

This paper is an attempt to introduce a need for cognisance of the physical as well as the man-made environment in the public administration of South Africa.

A historical overview with reference to environmental concern in South Africa is presented after which some reasons for the ever deteriorating environment of the country, are given. One of the most significant reasons identified is the lack of means and experience at institutional and organisational level of government regarding environmental management. The author is of the opinion that the biggest problem in South Africa is the lack of effective communication between the various role players. This leads to insufficient coordination (an organisational product of efficient horizontal communication) and insufficient control in the final instance (an organisational product of efficient vertical communication).

Another major reason for South Africa's deteriorating environment is the uninformed state of the public regarding sustained development, utilisation and conservation of the physical and man-made environment. To address this problem, the author calls for a higher level of transparency and accessibility in the day-to-day public administration of the country and the service-rendering by the public sector.

Subsequently some proposals on improving the environment and possible contributions of an environmental dimension in the country's public administration, are made.

It is hoped that this paper will stimulate environmental awareness among the public administrators of South Africa.

## 1. INTRODUCTION

Concern for the environment is not a product of the 1970's. As travellers on *Spaceship Earth*, mankind on the southern tip of Africa has for over 300 years made isolated attempts to control the misuse of the environment. This can be traced back to the laws promulgated within 5 years of the arrival of Jan van Riebeeck at the Cape in 1652. It was however only in 1970 that man realised that an effective relationship between humans and the environment cannot be regulated through *ad hoc-legislation* only. It was in this year that the United States of America promulgated their National Environmental Policy Act which gave rise to approximately half of the world's nations enacting some form of legislation for environmental protection and the consequent signing of numerous international agreements on environmental matters (Fuggle & Rabie 1992:11-12).

Unfortunately 27 years later, Earth and its inhabitants are still faced with a deteriorating environment - in spite of an abundance of environmental philosophy and dogma, laws and regulations (Beale 1980:2). Prominent environmentalists identify, among others, the lack of environmental management, shortcomings at institutional and organisational level of government, bureaucratic syndrome, colonialism and insufficient education on environmental matters as possible reasons.

In this paper an attempt is made to introduce a need for a real cognisance of a purposeful study of the environment, especially in the training of efficient public administrators in South Africa. The relationship between the earth's environment, people and government is described and a historical overview of environmental concern in South Africa is provided. This is followed by an identification of the primary role players with reference to effective environmental management in South Africa. Specific reasons for increasing concern for the environment are also outlined and possible proposals on how to manage the environment in a more sustainable manner are made. This is finally followed by an exposition of possible contributions by the subject Public Administration.

## 2. RELATIONSHIP BETWEEN THE EARTH'S ENVIRONMENT, PEOPLE AND GOVERNMENT

In order to determine the place and role of people and government in the earth's environment, one has to clarify the term *environment*.

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### 2.1 Environment

From outer space the earth looks relatively insignificant - just another planet in orbit round a minor sun in a minor solar system - a tiny speck in the vast expanse. And yet the earth's environment is the only place in the entire universe, as far as we can tell, that sustains life as we know it. If it should lose this ability, mankind as species - together with all other forms of life on this planet - would cease to exist. As a result man is forced through the modern technology media of for example communication and transportation, to identify and join the village-like interdependent system of the so-called *Global Village* (Austin, Honey & Eagle 1987:G5).

There is a wide range of opinions on what the most acceptable and apt definition of the environment is. The South African legislature has defined it as "... the aggregate of surrounding objects, conditions and influences that influence the life and habitats of man or any other organism or collection of organisms" (Environment Conservation Act 73 of 1989). The Department of Environmental Affairs and Tourism defines the environment as the place where we live, learn, work, shop, enjoy nature, play and relax as well as part of our history.

For the purpose of this paper a definition found in the report of the President's Council (South Africa 1991:2) has been adopted:

"The environment is the aggregate of physical, biological and cultural conditions affecting the life of an individual human being or the community."

### 2.2 Man: Beast or manager?

Nature is all the biological processes making up the interre-lations of organisms with their environment. The totality of these interactions between organisms and their environment is referred to as ecology, or the ecosystem (Edmunds 1973:3). Mankind as *Homo Sapiens*, forms part of nature "and whatever we have invented to increase our stature, whatever we have done to rearrange the global scenery, nature still claims us in the end, with a terrible indifference. She will, as John Burroughs wrote, make good compost of us all" (Clarke 1991:13).

Modern man has retained the necessary survival instincts; the animal instincts of his pre-human past but have unfortunately also picked up some behavioural patterns which seem inimical to his survival as a species. He appears to be bent on destroying the natural world on which he is totally dependant (Clarke 1991:13).

Clarke also states that it was fashionable in the 1960's to believe that man was born a killer; referring to the two world wars fought in the first half of the 20th century. Richard Leakey, the Kenyan fossil hunter, in 1977 however, expressed the thought that man must have had a more basic instinct than a killer instinct. He suggested that it was co-operation.

Co-operation brought about the survival of humans because they learned to hunt as a team. This instinct assisted man during three major crises, namely when they as man apes were forced to abandon the retreating forests and compete with the great predators out on the plains. The second crisis was when, as fully developed *Homo Sapiens*, they began to live in organised settlements and grow their own food. The third great crisis was the 20th century when humankind moved away from being predominantly rural to becoming irrevocably metropolitan - again a test of man's talent for co-operation.
(Clarke 1991:2-3.)

Man's increasing need for protection, co-operation, and joint utilisation of natural resources resulted in the esta-blishment and development of specific forms of associations or groups of people (villages) (Norris & Haring 1980:6). This again led to the need for several villages to be united in a single complete community, large enough to be nearly or almost selfsufficient. After that the need developed for a state to unite various communities (Gottmann 1973:1; Rumley & Minghi 1991:43). Man became a manager.

### 2.3 Governmental authority

Due to the ever-increasing number of public services which had to be rendered by a legitimate ruler and his/her appointees as well as unforeseen external variables (usually environmental), a clear horizontal and vertical demarcation of governmental authority became necessary. Horizontal demarcation of govern-mental authority manifested in the separation of legislative, executive and judicial authority (Cloete 1977:19). Vertical demarcation of governmental authority materialised in the creation of a central government level with subordinate provincial and local government levels (Cloete 1977:166). Maass (1959:9) states that demarcation of governmental power is neccessary to help realise the basic objectives or values of a political community. In other words, to bring order to the living, authorities with specific geographical areas of responsibility (service areas) were created.

## 2.4 Place and role of the individual

When describing the place and role of the government in a country, one tends to look from the government's point of view only. As a result, government is seen as a centralised unit from which numerous authoritative and communicative channels extend to, among others, regional and local executive institutions.

In comparison to this theistic view of the state as the prominent centre of community life, humanism emphasizes the human being - a member of the public (Fesler 1949:10). All government actions are naturally aimed at addressing needs of the community members within a specific service area. Fesler (1949:9), however, identifies the possibility of the manifestation of a "worm's eye view of the ordinary citizen" with reference to administration (many layers of government that minister to his/her needs, regulate his/her freedom of action and demand his/her financial support).

## 3. ENVIRONMENTAL CONCERN: INTERNATIONALLY AND IN SOUTH AFRICA

The excessive number of passengers on Spaceship Earth brought about considerate pressure on the ecosystems and natural resources of the planet, resulting in environmental degradation such as the pollution of air and water and total exploitation of some earth resources to the point of extinction (Fuggle & Rabie 1992:4-6).

But, why should we conserve the environment? According to Fuggle & Rabie (1992:7) this is not a descriptive empirical inquiry but a question based on what is good, right, or obligatory - an ethical question. Prior to 1980 the ethical basis for environmental conservation was entirely utilitarian - conservation based on the environment's utility to humans. The last decade has seen a marked convergence between the world's major religions and the world's leading conservation organizations. Those who believe that the universe and humankind were created by God (Christianity, Judaism and Islam) recognize that nature has a right to exist over and above its utility to man (Fuggle & Rabie 1992:9-10).

While isolated injunctions and attempts to control misuse of the environment can be traced from biblical times, laws specifically designed to regulate environmental degradation have only been a product of the last 300 years. Until the late 19th century, environmental laws were directed at specific forms of pollution and at protecting occasional natural areas. The first proof of declaring the public responsible for the conservation of natural areas came in 1864 when the United States' Congress passed a Bill preserving the Yosemite Valley in California.

In South Africa *Placaats* were promulgated within five years of Jan van Riebeeck's settlement in the Cape to protect trees and gardens against destruction and drinking water against pollution (Fuggle & Rabie 1992:13-14). A matter of basic survival!

During the period from 1800 to 1910 extensive legislative provisions were made for aspects such as the control of grass-burning and the protection of trees. In 1894 the first game reserve in South Africa was established, namely the Pongola Game Reserve.

The period between 1910 and 1969 is characterised by the first national legislation in South Africa of an exclusively environmental nature through the National Parks Act 56 of 1926. Various other legislation were subsequently promulgated on matters such as marine resources (1940), advertising along roads (1940), soil conservation (1941, 1946 & 1969), water pollution (1912 & 1956), air pollution (1955) and land-use planning (1947).

It was, however, only in 1970 that the current environmental era dawned, both internationally and nationally. In the United States of America the National Environmental Policy Act was signed. The first *Earth Day* was held at Woodstock in Vermont on 22 April 1970 and international concern for the environment was reflected in the United Nations' Conference on the Human Environment, held in Stockholm in 1972.

The government of South Africa's first official acknowledgement of its place and role in the international sphere of environmental management was demonstrated in 1971 when a cabinet committee was appointed to investigate environmental pollution. A non-statutory South African Committee on Environmental Conservation was in turn established to advise the cabinet committee. This non-statutory committee, which was renamed the Council for the Environment in 1975, consisted of representatives from government departments and other administrative institutions concerned with environmental issues.

Prior to 1973 the control of pollution and the conservation of natural resources had been entrusted to the Department of Planning, which in 1973 became the Department of Planning and the

Environment. After going through a rationalization process in 1980 and a few name-changes, the name of the Department was subsequently changed to the Department of Environmental Affairs and Tourism. Presently, it no longer only coordinates the environmentally relevant actions of other administrative institutions, but also administers some environmental statutes and provides policy guidelines for their administration.

In 1982 the Environment Conservation Act No. 100 was promulgated and in 1983 the Council for the Environment as a statutory advisory body to the Minister of the Department of Environment Affairs, replaced the previous non-statutory committee (Raad vir die Omgewing 1989:6).

A variety of new legislation were promulgated on environ-mental matters that had either not previously been subject to control or had not been treated satisfactorily. The most important of all being the proclamation of the Conservation Act No. 73 of 1989 whereby the Department of Environment Affairs aims to ensure the effective protection and sustainable utilisation of the environment for the benefit of everyone in South Africa.

A more recent manifestation of governmental concern for the environment was the previous State President's directive to the then President's Council to investigate and report on a policy for a national environmental management system. The report was published in October 1991 and in response to this, a draft White Paper on a national environmental management system for South Africa was compiled by the Department of Environmental Affairs in 1993.

More than 20 conservation organizations were established in South Africa between 1970 and 1975 alone. Since then the number has grown in such a way that a need arose for coordinating bodies such as the Habitat Council (created in 1974) which acts as a link between the government and the non-governmental organisations (NGO's).

Official publications like the 1991 *Report on a national environmental management system* by the former President's Council, a Department of Environmental Affairs report entitled *Pollution 1971* and the Department of Water Affairs' *Management of the water resources of the Republic of South Africa* in 1986 appeared during this period. Examples of popular publications are a new genre of environmental books such as *Back to Earth* by J Clarke and *Going Green* by J Cock & E Koch as well as magazines like Wildlife Society's *African Wildlife* and the Department of Environmental Affairs and Tourism's *Conserva*.

## 4. PRIMARY ROLE PLAYERS REGARDING ENVIRONMENTAL MANAGEMENT I SOUTH AFRICA

There are several primary role players involved in managing South Africa's environment. Foremost is the Department of Environmental Affairs and Tourism which according to the Environment *Conservation Act No. 73 of 1989,* aims to ensure the effective protection and sustainable utilisation of the environment for the benefit of everyone in South Africa. The Act also makes provision for a Committee for Environmental Coordination which has to promote effective coordination between the represented government departments and other executive institutions in South Africa with reference to environmental management. In addition to the aforementioned, the Act also provides for the creation of the Council for the Environment in order to advise the responsible minister on national environmental policy and strategy.

Secondly there are various executive government departments who are in one way or the other involved with the management and administration of specific environmental issues. The Department of Water Affairs and Forestry's efforts in administering the *Water Act no 54 of 1956* with reference to the effective management of water and forest resources in South Africa serves as example. The Department of Land Affairs, Department of Mineral and Energy Affairs and the Department of Health are further examples.

The provincial administrations are also involved with environmental management in the sense that they are mainly responsible for nature conservation, land-use planning, waste disposal, seashore management and noise control within their own provincial service areas. At local government level, the various municipalities and city councils have to execute legislation with regards mainly to town-planning, air pollution, noise control, waste and water management, creation of beneficial living -, relaxing - and working environments as well as the preservation of open spaces.

Research institutions such as the Human Science Research Council (HSRC), Council for Scientific and Industrial Research (CSIR) and universities act as partners in a continuous effort to handle complex situations and research in the environmental conservation field.

Non-government organisations (NGO's) and interest groups are established by the public with the sole purpose of sustainable development and conservation of the environment. Examples are the

Wilderness Trust of South Africa and the Wildlife Society.

The private sector's participation in conservation of the environment have over the years come from mainly organised commerce and industry holding the conviction that the maintenance of a favourable balance between development, utilisation and conservation of the environment, will benefit the economy in general.

Furthermore International Treaties like the Vienna Convention for the Protection of the Ozone layer adopted in 1985, bear witness of South Africa's place and role in the *Global village*.

Schools usually incorporate some environmental conservation aspects in subjects like Biology and Geography. Unfortunately some of the teachers are desperately lacking sufficient knowledge of environmental matters (Clarke 1991:11).

Tertiary education on the environment consists of a few universities involved with environmental studies and -aspects in their own regions, but the total environmental dimension is not always easily identifiable. Technicons are involved with the training of a major percentage of the personnel needed for various types of environmental inspection services.

Mass media are aiding in teaching and informing the public regarding various aspects of the environment through media such as the television and radio, newsletters and good quality magazines.

Regardless of the abovementioned, South Africa as well as the rest of the world, still has a deteriorating natural and man-made environment ...

## 5. SOME POSSIBLE REASONS FOR SOUTH AFRICA's DETERIORATING ENVIRONMENT

Some possible reasons for South Africa's continuous deteriorating environment, which have been identified by individuals and writers in the field of environmental management, are among others, the following:

**5.1** The nomadic way of life by humankind over the years resulted in *Homo Sapiens* taking full advantage of that which nature offered him. No effort was wasted on sustainable development, utilisation or conservation of resources (Fuggle & Rabie 1992:6-7). Until very recently most environmental issues in South Africa have been characterised by a rigid and centralised resolution of conflict and struggle, bargainings and trade-offs among diverse interest groups (Fuggle & Rabie 1992:80) and an exclusive focus on the preservation of wilderness areas - an authoritarian conservation perspective (Cock & Koch 1991:1-2). "It is the process of colonialism and apartheid that has destroyed the balance between economic resources and population growth and thereby caused environmental degradation" (Cock & Koch 1991:66).

**5.2** Clarke (1991:317) holds the view that the previous National Party government has, for many years, not been serious about environmental management. He believes that most political office bearers have simply not understood the situation and that they were short-term thinkers - more concerned with winning the next election than with the long-term survival of the country. The EEPI Committee has been of the opinion that the previous government and education system did not succeed in bringing about a clear and effective policy for environmental education in formal education (EEPI Committee 1994:2).

**5.3** Loots (1994:22-23) and Fuggle & Rabie (1992:78-79) identify the multiplicity of executive institutions with insufficient authority, a resulting fragmentation of legis-lation, ineffective coordination and dualistic conservation assignments conferred upon particular institutions as a primary reason for South Africa's mismanaged environment.
But, how can this situation be improved?

## 6. PROPOSALS ON IMPROVING SOUTH AFRICA's ENVIRONMENT

Some of the proposals that have been made by various environmentally inclined institutions, organisations and individuals with reference to improving South Africa's environment, are the following:

**6.1** It is essential that the environment itself be seen as an indivisible unit. Any attempt to manage the environment in a sustainable manner should be considered and approached from a holistic viewpoint. An integrated environmental management system should be executed in concert with aspects such as existing and expected constitutional structures, legislation, organisational changes and division of functions between government institutions (South Africa 1993:5).

**6.2** Effective environmental management in South Africa calls for a partnership between the Government and the public (South Africa 1993:4). In order to give effect to the national environmental management system of South Africa, the Department of Environmental Affairs and Tourism should conduct a continuous process of consultation, coordination, monitoring, policy formulation, planning, legislation and evaluation that is designed to direct and influence the environmentally orientated activities of all government institutions, organisations, companies and other participants in such a way that common causes and objectives are pursued. Eventual success will depend on the expertise, dedication, initiative and enthusiasm of the persons who man and manage the system (South Africa 1993:16).

**6.3** South Africa needs a centralised statutory environmental legislative institution with Cabinet status which can formulate and update environmental policy with a holistic view and control the efficient execution thereof (Cock & Koch 1991:157; Clarke 1991:319). Regarding the execution of environmental policy, attention should be given to maximum devolution and decentralisation of executive functions to institutions at provincial and local levels of government with an encompassing democratic participation in decision-making (Fuggle & Rabie 1992:81). Because of South Africa's exceptionally diverse order of natural resources, the country still needs more effective state regulation, control and protection of the environment (Cock & Koch 1991:5). A coherent and purposeful participation by national, provincial and local levels of government, parastatals and organisations within civil society in the further development and implementation of the Government's Reconstruction and Development Programme (RDP), is essential (Walmsley & Botten 1994:23).

**6.4** The achievement of sustainable development within cities is impossible without competent, effective and representative local authorities. They should always work in partnership with citizen groups, business societies and non-governmental organisations (NGO's) in a transparent, legitimate and accountable manner (Walmsley & Botten 1994:18). Planning for urban areas should be done in conjunction with the inhabitants thereof (Muniviro Augustus 1992:3-4; Suid-Afrika 1991:238).

**6.5** Cock & Koch (1991:32) are of the opinion that experiences of environmental deterioration in the Eastern Bloc, the West, as well as the Third World, have shown that no government, however democratic, can be fully relied upon to protect the environment. They feel that the creation of a powerful network of private groups and organisations within civil society, which is capable of exerting constant pressure on the state regarding protection of the environment, guarantees better results.

**6.6** It is of cardinal importance to establish an informed population with reference to the promotion of and rational use of the environment (South Africa 1993:6). Beale (1980:147-148) identifies training, education and communication as the most crucial integrating and distributive mechanisms regarding the effective implementation of a national environmental programme. Achievable environmental education and environmental information programmes should be deployed in co-operation with education authorities, government and private establishments concerned, as well as the public media (South Africa 1993:12). All South Africans should be educated in the value and wise use of water (Cock & Koch 1991:138). For example, Clarke (1991:97) highlights the fact that 98% of the earth's water is undrinkable sea water. The remaining 2% comprises fresh water of which 1.2% is frost-bound in the polar caps and glaciers. That leaves only 0.8% available for human consumption and irrigation of the world's crops, the manufacturing of its steel, the cooling of its powerstations and the washing of its millions of cars.

**6.7** Promotion and implementation of a proper hierarchical waste management process (reduce, re-use, recycle, incinerate and land-fill) should be addressed through:

- Coordination of activities between the private and public sectors of the economy
- Stabilisation of recycled material markets
- Creation of public awareness
- Establishment of a database on the generation and composition of the waste stream (Muniviro, Mei 1996:21).

**6.8** South Africa must take note of, and comply with international agreements and plans with reference to the man-made environment as well as link into the international networks dealing with sustainable development and utilisation of the environment (Walmsley & Botten 1994:18; Suid-Afrika 1991:163).

**6.9** In conclusion it can be said that man became increasingly aware that all physical, biological and cultural elements and processes interrelate and influence each other and that the environment of *Spaceship Earth* should be developed, utilised and managed using a multi-dimensional, multi-disciplinary, multi-agency and holistic approach (integrated environmental management).

## 7. POSSIBLE CONTRIBUTIONS BY PUBLIC ADMINISTRATION

With reference to the abovementioned place and role of man (individual) and its collective and organisational structures (government), as well as the individual possible reasons for environmental deterioration and some proposals on improving the state of the environment, it is clear that the incorporation of an environmental dimension in the training of public administrators is desirable. The following aspects should be considered:

**7.1** Public Administration (the subject) is constantly seeking knowledge about and analysing the experiences that are relevant to all the activities within the boundaries of the public sector domain. Due to the fact that the public sector has been identified as the locus of all the collective and regulatory actions of environmental administration, it logically becomes part of Public Administration's field of study. With reference to the primary role players identified in par. 4 above, it is clear that a major part of South Africa's executive governmental structure is involved with specific aspects of environmental administration.

**7.2** Public Administration aims to train more effective public administrators. In the light of the fact that they have to provide services and goods on an ever increasing scale in an environment where the resources are limited, an environmental dimension regarding especially the physical and man-made environments needs to be incorporated into the planning and administration framework at all three government levels. By training the public servants in strategic important generic administrative functions such as policy-making, planning, organisational behaviour, communication, coordination and control, a more efficient public administration will manifest.

**7.3** The focus of Public Administration and the training of public administrators in general should incorporate the following aspects/approaches:

- An acknowledgement of the interdependency of South Africa's society with the rest of the world (globalisation)
- A more humanistic approach with reference to the delivering of public services
- An identification of the public sector, private sector and the community (eg the NGO's) as partners in the society as a whole
- Sufficient usable knowledge about the origin, mission, objectives, responsibility areas and functioning of all the executive public sector institutions
- A manifestation of more efficient and effective macro-organising by means of a bigger focus on the place and role of communication with its horizontal product, coordination, and vertical product, control.

**7.4** A more humanistic approach towards public service delivery calls for an understanding of environmental and
spacial concepts such as:

- The organisational structuring and distribution (physical localities) of the head offices and branch offices of all the public sector institutions
- Nature and size of the responsibility areas of the arious public sector institutions
- Extent of transparency reflected by a public sector institution with reference to, among other, its functions
- Degree of physical accessibility reflected by a specific office of a public sector institution

- Efficient information and marketing media with which the public sector institutions can internally, mutually, externally, as well as with the general public, create a higher degree of transparency and accessibility. Making use of a more detailed presentation in the telephone directories of Telkom or the distribution of information pamphlets at certain central community centres such as municipalities, libraries and schools serve as examples.
- Geographical public administration as the rendering of public sector services by geographical distributed executive institutions - even accross provincial and national borders (Bours 1992:3).

I am of the opinion that the effective implementation of the aforementioned recommendations is possible and that it should make a significant contribution towards a more effective training of the public servants of the 21st century. Hopefully, the *"worms eye view of the ordinary citizen"* regarding the public service delivery by a government can be changed to a "bird's eye view" ...

## 8. CONCLUSION

This paper has dealt with the importance of an environmental dimension in the public administration of South Africa. An attempt has been made to identify a relationship between the earth's environment, mankind and governments, with the ordinary citizen as the prominent centre of community life. This was followed by a historical overview of environmental conservation activities. It became clear that the current era of actual environmental concern (internationally and nationally) only dawned in 1970. The resulting primary role players with reference to environmental management at this moment of time in South Africa, were also identified.

Regardless of the international and national concern for the environment and inputs by specific primary role players, South Africa and the world's environment is still deteriorating. Some possible reasons identified by individuals and writers in the field of environmental management with relation to South Africa's deteriorating environment, were identified. A general lack of means and experience at the institutional and organisational levels of government as well as an uninformed public regarding efficient environmental management, seem the most significant. Subsequently some specific proposals on improving the environment of South Africa were made with the most enumerative being that, because of the fact that all physical, biological and cultural elements and processes interrelate and influence each other, the environment of *Spaceship Earth* should be developed, utilised and managed using a multi-dimensional, multi-disciplinary, multi-agency and holistic approach (integrated environmental management).

In the last instance some possible contributions by the subject Public Administration, with reference to the manifestation of an actual concern for the environment in the training of public administrators and ordinary citizens, were identified.

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# Communities in South Africa and the development of an acceptable environment

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## Introduction

The focus of this paper will be on South African urban settlements and the development of an acceptable environment. South Africa as a developing country consists of First- and Third World elements. Population growth will make great demands on South Africa's economy and social services which will place pressure on its environment and natural resources (Mostert & Lötter, 1990). According to the CDE (The Centre for Development and Enterprise) (1995:10) the population projected for South Africa will be 45,4 million for the year 2 000 and 54,1 million for the year 2011. The number of illegal immigrants places an additional strain on the environment in South Africa. The CDE (1995) has an estimated figure of 8 million illegal immigrants.

In the 1980s the official definition of 'urban' included only those people who lived in formally proclaimed cities or towns. This excluded areas like Inanda outside Durban or the Winterveld north of Pretoria. Many of these densely settled rural areas had no connection at all with agricultural production. The CDE (1995) included settlements within 40 km of metropolitan areas as urban areas.

According to the CDE (1995) the landscape of South Africa consisted of 41,2 million people. People were distributed in the following way:

| | |
|---|---|
| Metropolitan areas | (16,5 million - 40% of the South African population) |
| Large cities | ( 3,6 million - 9% of the South African population) |
| Small towns | ( 3,3 million - 8% of the South African population) |
| Rural | (17,8 million - 43% of the South African population) |

Apartheid has had an impact on spatial patterns of development, but while it may have distorted urbanization, it did take place. What led to this distorted urbanization? In 1948, when the Nationalist party came to power, they introduced a policy of separate development. This policy advocated that South Africa was made up of many ethnic groups, and that each group should be based in their homeland. This artificial creation was for a long time contested in South Africa and elsewhere. Homelands and later the independent Bantustans had virtually no recognition abroad.

Urbanization under the previous government led to displaced urbanization e.g. the Winterveld north of Pretoria (on the edge of the previous so-called homelands). Between 1946 and 1951 the number of blacks in urban areas passed the number of urbanized whites (Krige, 1988:8). Resettlement areas also developed e.g. Botshabelo close to Bloemfontein. The original settlement was a resettlement camp for ex-farm workers and others who were forced to leave their previous homes as far afield as Cape Town. This settlement later became a growth point for industrial decentralization. Also an artificial creation of the previous government. This distorted urbanization patterns mentioned led to many of the realities that South African communities are confronted with today.

## Realities in South African communities

South African cities can be classified as Western cities because they have different functional zones and residential areas. These residential areas range from high income residential areas to townships and informal settlements. Rapid urbanization places strain on township facilities e.g. housing and municipal services. Sewerage systems, refuge removals, water provision, road systems, open space, sport- and recreation facilities become quite inadequate.

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Approximately 5 million people live in South Africa without an adequate water supply and sanitation (Crankshaw, 1993). The standards set for the quality of drinking water and its distribution inside South Africa do not meet First World regulations. In South Africa an adequate supply of water in an urban area must be at least 1 water point (standpipe) per 25 households, or a water supply within 50 metres of each household, providing for at least 30 litres per person per day. Of great concern is the unequal provision of water provision, seen as quite common to one group and a form of luxury to others (Ismail, 1996).

Informal settlements emerge all over the country. In 1990 over 7 million people were living in informal settlements in South Africa (Cock & Koch, 1991). Estimates based on aerial photographs showed that there were 97 000 shack dwellers in Soweto in 1990 - an increase of 22% in 2 years. Forty one percent of Soweto's houses have backyard shacks. This increases the population density and leads to increased pressure on the environment.

Alexandra township has a population of 175 000 people. Most people live in shacks without water and electricity. They rely on the bucket system for sewage. Rubbish piles up in the street. A poor living environment can cause health problems such as respiratory infections and gastroenteritis. Infections are made worse by coal-smoke pollution, especially in winter when coal stoves are used more frequently. The overcrowding of space also increases the rate of infection.

Approximately 400 000 - 700 000 people in the Central Witwatersrand region are without water and sanitation services. Illiteracy, poor education and ignorance of the consequences of personal and family hygiene practices and customs place constraints on the development of an acceptable environment (Water Research Commission, 1993).

The Zamdela township, outside Sasolburg in the Free state, is situated in an important industrial area with many chemical factories. (Cock & Koch, 1991). The pollution in Zamdela causes many health problems. People suffer from eye problems, sinusitis, chest and skin problems.

The abovementioned constraints are examples of the realities facing role players concerned with the development of acceptable environments for all communities in South Africa.

**The role of local authorities**

Local governments provide a platform for communities to improve and develop the environment. Local governments are constitutionally compelled to promote and develop the environment. The Constitution of the Republic of South Africa 1996 (Act 108 of 1996) states the following about local governments:

Objects of local government.
(1) The objects of local government are -

- (a) to provide democratic and accountable government for local communities;
- (b) to ensure the provision of services to communities in a sustainable manner;
- © to promote social and economic development;
- (d) to promote a safe and healthy environment;
- (e) to encourage the involvement of communities and community organisations in the matters of local government.

Local authorities have a direct influence on the environment in which we live, work and practise sport and recreation. Numerous factors for instance increased urbanization trends, the conservation- and ecological advantages of open space, South Africa's return to international sport, major political changes and the shortage of available space necessitates the development of an environment acceptable to the majority of South Africans.

In the preamble of the constitution it is stated that: 'We the people of South Africa recognize the injustices of our past; Honour those who suffered for justice and freedom in our land; Respect those who worked to build and develop our country, and believe that South Africa belongs to all who live in it, united in our diversity.......Improve the quality of life of all citizens........'.

The Bill of Rights also states the following about the environment:
Everyone has the right-

(a) to an environment that is not harmful to their health or well-being; and

(b) to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that -
  (I) prevent pollution and ecological degradation
  (ii) promote conservation; and
  (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

The Bill of Rights and objects of local government must be kept in mind when we search for solutions to the development of an acceptable environment. The problem, however is that local authorities are confronted by reality.

The inability of local authorities, to address environmental problems are hampered by inadequate funds, manpower and knowledge. Various studies have shown the lack of a mission, aims and goals to provide driving power and direction to developments. This usually leads to an environment characterised by the incorrect location of facilities, inferior quantity and quality of facilities, insufficient funds, the limited mobility of people, no training, unemployment and poverty.

**Realities stimulating the development of an acceptable environment**

Solutions to problems are not easy to find. The following are a few realities that stimulates the development of an acceptable environment:

- The new political dispensation makes it possible for people to live where they want to live and to own property. This may lead to less pressure on some areas in the environment. 'Normal' economic forces and urbanization forces will develop.
- Municipalities are under pressure to reduce the amount of waste generated. In South Africa 29,6% of beverage cans are recycled. Recycled paper and board has grown to 28,4% of the tonnage of paper and board currently produced for domestic consumption. Recycling waste saves money and helps to improve the environment.
- According to the CDE (1995) the population increase is lower than expected. The CDE (1995) states that the population of South Africa in 2020 should be projected at 53,4 million rather than earlier projections of 59,7 million. Less people will place less pressure on the environment.
- Community participation is very important. A bottom-up approach should be taken with all new developments where planning is done with the people and not for the people. A lot of money is wasted by local authorities due to improper planning. Tax payers have the right to know how their money is spend. In Alberton e.g. a sport facility of R300 000 was built and would be demolished three years later to make space for CBD developments. In Randburg the ratepayers associations are very active and they have a great influence on their local authority in developing an acceptable environment (Hugo *et al.*, 1992).
- The empowerment of women resulted in the growth and development of the informal sector. The informal sector creates jobs which in turn leads to a higher standard of living.
- In the past planning was done on a basis of artificially dividing cities and ethnic groups. Local authorities joined forces to provide facilities and plan for cities in totality. Open space and facilities also became accessible to the majority of people. Normalization of the political situation works towards a culture of paying for services. Historically disadvantaged areas are subsidised by higher income residential areas. Various development projects were also launched by the government. This will assist people to be lifted from a spiral of poverty.

- According to the CDE (1995):

  - Population projections are lower than those current before 1992.
  - There has been a gradual and widely diffused improvement in black living standards (between 1985 and 1995), despite a drop in the real per capita income of the country as a whole.
  - The late 1980s and early 1990s have witnessed a decline in black fertility rates. Blacks

achieved an equivalent decline in fertility in a shorter period than it previously took whites.

- By the year 2 000 there will be 5 million less people in the metropolitan areas than was previously expected, and by 2010 there will be 8,5 million less.
- South African metropolitan areas are not, nor are they ever likely to be, very large in world terms.

**What can further be done to develop and improve the environment?**

- Informal settlements were recognized in the 1970s as a solution to the problem of providing housing to the poor. Improvement should further be encouraged, e.g. by providing access to loans, providing investment opportunities and facilitating access to building materials.
- There is a need to overcome the inequality between the township and the suburban environment and this will form the basis for healing the urban environment. The development of an acceptable environment makes it possible for all communities to improve the quality of life of all citizens. It provides a space for communities to be constructive during their leisure time. Added to this it becomes possible to practise sport and recreation.
- Environmental audits becomes necessary. According to Bisset (1984:12 ): 'an environmental audit is an account of the environmental consequences of operational developments accompanied by an appraisal of the effectiveness of management to ameliorate or prevent harmful impacts'. In environments where dangerous chemicals are a hazard to health communities need to challenge companies.
- A complete inventory and environmental analysis is necessary to determine conservation areas, land types, geology, slopes, hydrology, types of soil, vegetation and open space. One should determine which type of activity is possible in which type of environment.
- Good planning is necessary for any development. This means that any organization, firm, authority or establishment that controls activities needs to set itself goals in terms of what they want to attain concerning their relationship with the environment. These goals need to be evaluated from time to time enabling alterations and corrections to be made' (Hugo & Bewsher, 1993).
- Each socio-economic group has different needs concerning the environment. A socio-economic analysis needs to be done to determine planning cells. Specific needs can then be addressed. In townships high density housing creates different needs than e.g. higher income residential areas. Due to insufficient planning facilities are used for different purposes as it was intended for. Wilson (1989) identified a tennis court in Soshanguve that is now used as a soccer field. In Soweto a golf course was converted into a squatter settlement with a soccer field. Better control over existing facilities is also necessary.
- Providing open space and facilities to communities must be done primarily by local authorities. Municipal parks and facilities are often the only accessible open space to people. Most often the only available open space belongs to local authorities. Open space and facilities provided by local authorities are more permanent. Open space plays a role in the local economy. Taxes are used to develop open space.
- Open space should be planned to create a network. Open space should also be protected from CBD encroachment. Open space should also be extended to industrial areas. Industrial park development is a positive step in this regard to develop an acceptable environment. Open space regulates micro-climates and improve the quality of air. A diversity of species can be conserved in rivers, koppies (hills) and ridges. Ecological areas controls floods and raises the water table. Open space can be extended by recovering e.g. old mines and dumps. Open space should also adhere to minimum standards. Policy should exist to protect air-, water- and land resources and to improve nature. Preference should be given to indigenous trees. Development projects should be ecologically friendly. Programmes should be developed and implemented to make people more aware of the environment. An annual environment day could e.g. be introduced.

In this short overview we can conclude that South Africa has many challenges concerning the development of an acceptable environment. Fortunately South Africa is in a position to face these challenges and provide solutions.

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# Indigenous myth, story and knowledge in/as environmental education processes

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> *Diverse communally sustained group memories were suppressed and supplanted by a unified historical curriculum, aimed at the preservation of a 'shared national heritage'. Communal traditions, customs, festivals, rituals were redefined as residues of ignorance and prejudice and replaced with a uniform calendar of national festivities and authoritatively set 'national-usages', or wrenched from communal administration and then adapted and invested with new global-national meaning. (Bauman, 1995:235)*

## ABSTRACT

*Historical evidence, and experiences within an African case of materials development for environmental education, expose anomalies and transformations within a recent popularising of indigenous knowledge. This raises questions of how so-called indigenous knowledge might foster sustaining transformations within cultural perspectives inhibiting the earth's capacity to sustain life. A critical mapping of emerging issues suggests that indigenous knowledge might simply be a grounded knowing amidst a plethora of similar open-ended reorientating symbolic capital arising in local story and experience in situations of risk. These processes may open the way for common sense sustaining actions where 'new ways of knowing out of old' continue amongst all indigenous to this planet. A utopian celebration of indigenous knowledge as mystical icon for sustaining reorientation may be misplaced.*

## INTRODUCTION

This paper is a discursive review of work on indigenous knowledge processes during an environmental education resource development project in southern Africa. Critical questions on indigenous knowledge are examined and emerging issues, themes and research findings documented for continuing work on social processes of environmental education. The complementary sociological works of Elias (1987, see also Mennell, 1992) and Bauman (1993, 1995) are sources of sensitising concepts for an engaging clarification amidst a recent turn that is giving icon-like prominence to indigenous knowledge. The developing story of and emerging ambiguity within indigenous knowledge processes is mapped with sceptical enthusiasm. Compelling ambiguity in developing risk may foster discontinuities for/in open-ended meaning-making processes where common sense knowing of old arises from and is reshaping of human steering choices.

## BACKGROUND

In southern Africa, a concern for indigenous knowledge is apparent in some early historical writings (Magema, 1919 and Samuelson, 1974) and an environmental education narrative is to be found in the works of Ian Player, Don Richards, Simeon Gcumisa and Frank Opie, for example (O'Donoghue, 1997). In the 1980's, indigenous knowledge developed as a key concern within resource development work with Khulani Mkize, Margaret Keogh and teachers like Henry Ngcobo and Bheki Nene.

Into the 1990's, Nguni materials were developed for environmental education when Mba Manqele, her mother and long-serving Natal Parks Board (NPB) staff with childhood memories of life in Zululand interacted with Rob around earlier materials and a text by Gcumisa and Ntombela (1993). The concern was not to record folklore, myth and story, but to examine these within earlier patterns of everyday life in developing socio historical context. An interest in indigenous knowledge extended to similar processes in The Netherlands, Rob's native Ireland and elsewhere (see O'Donoghue, 1995). Emerging questions shaped open-ended lines of enquiry where an earlier common-sense knowing was often set against

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what was happening to shape conservation problems in/of the present day.

### Tensions within interactive reconstruction

Throughout the educational resource development processes there were striking uncertainties and doubts among participants about the detail of patterns of daily life in earlier times. This was not simply a matter of vague childhood recollections or scant evidence of how people lived in earlier times. Early contributors tended to devalue the everyday of indigenous heritage. Most were reserved or even embarrassed at times, intrigued but often ascribing little of value to the past and African against the modern and topical. At other times Rob's excitement with the seemingly obvious and trivial details puzzled Nguni colleagues.

It was through cooperative struggle within the materials development team that the emergent indigenous knowledge materials came to life. This work involved collecting reliable evidence of old and an engaging realisation of underlying common sense as a useful symbolic capital for sustaining steering choices. A review of developing processes is shedding light on the `knowledge-creating' processes of cooperative meaning-making interaction amidst an interplay of naturalistic involvement and interpretative detachment (See epistemological narrative later in this text).

An initial series of magazine articles and four IKS pamphlets were printed and then reprinted in response to a steady demand from environmental educators until the project was resuscitated by Kim le Roux and Lynette Masuku van Damme in continuing research on environmental education processes. This paper was written as a contribution within this process. It documents earlier work and engages with the defining and clarification of indigenous knowledge processes in environmental education.

## DEFINING THE DEVELOPING CONCERN

The background to the resource development story above should be seen against the tricky question of defining indigenous/traditional knowledge. To review the emergence and defining of IKS in environmental education and wider post-colonial processes would necessitate another paper. Suffice it to mention a developing global concern into the 1990's and that 1993 was proclaimed the international year of `indigenous peoples and repressive regimes.' In anticipation of this a working group was convened at the 1992 EEASA (Environmental Education Association of Southern Africa) conference, on `story and indigenous knowledge'. Mba was a key contributor and in interacting with her and other friends and colleagues exploring the issue, a number of interesting perspectives emerged.

### Ethnic definition in opposition

Of particular note was the defining of IKS at the Midmar conference convened by Mba for a southern African working group on the topic. At this event Chavunduka (1995:2), scoping indigenous knowledge in an African setting, suggests that it *"refers to African history, African cultural heritage and African customs as developed in direct response to the physical and social realities in this part of the world."* This is a useful perspective, but it treats indigenous knowledge as fairly narrow ethno-historical processes, often in oppositional postures. When he adds: *"in the context of Africa, indigenous means what is African, or what Africa has learned and adopted from other societies"*, Chavunduka retains an African focus, but opens up the issue of developing interactions somewhat. This allows one to see diverse peoples in/of Africa shaping new knowing out of old(indigenous) as they grow to know with a sustaining common-sense in continuing life together in changing surroundings.

To open up a wider perspective for this review, **indigenous knowledge processes are seen as any responsive and sustaining symbolic capital, historically grounded and characterising a common-sense life-world amidst local peoples in particular socio-ecological settings around the world.**

This sensitising abstraction may allow an historical clarification of oppositional politics and a revealing of utopian ethnic elevation within moral imperatives of post-colonial retribution. Also evident is an intermeshed, naturalistic hyper-reality seeking to recapture past harmonies. These complex processes are often hidden from view within rationalist hegemonies where knowledge is reduced from knowing in context to a detached and universal, objective commodity, information. Careful socio-historical scrutiny is necessary to follow the development of involving fantasies of utopian ideals lost and developing rational models of process to facilitate a revival of indigenous environmental knowledge heritage, amongst others.

### Utopian ideals shaped in an ecological turn

Behind what we experience are long-term historical processes that have shaped what we are today. Strong feelings of suppression and loss arise in us as we encounter and come to value stories of past harmonies that might be recaptured to resolve the problems of the present. Schama (1995) examines some long-term shaping processes in his epic work *Landscape and Memory*. He maps the twists and turns that helped shape a sustaining Western myth amongst humans now interacting on a global scale. It is within this continuing global intermeshing that one finds the fairly recent popularising of indigenous knowledge in Africa, following experiences of suppression and loss within colonial intrusions. The latter extensions of the cultural crusades of Europe continue both overtly and subtly within present-day globalising trajectories.

The roots of a developing revival of a strong concern for indigenous knowledge in/and environmental education include a `utopian ecologising' of earlier peoples (O'Donoghue, 1997:218). As an example of a global 'green-tagging' of indigenous people , developing ecological knowledge was the text for inscribing the San (Bushmen) as custodians of indigenous harmonies lost. The hinge of this turn is made explicit in a 1970's text in which ecological symbols are overlayed on idealisations of San life to construct a utopian myth that came to be widely accepted:

> *The Bushman's* ***place in the ecology of the reserves*** *is that of the* ***predator*** *on the ungulates, springhares, jackals, foxes, rodents, birds and insects which they hunt and eat. Bushmen are also the rivals of browsers and fruit eaters for the edible plant foods. In collecting plants with edible seeds, the Bushmen act as* ***seed distributers****. although the importance of this* ***role*** *is less than that achieved by mammals and birds in the act of seed dispersal. In their utilisation of bulbs and tubers, they were careful not to strip an area completely but* ***always leave some*** *plants intact as seed-bearers for the next season.*
>
> *....Bushmen hunting has not been sufficiently intense to cause any disturbance of the* ***ecological balance*** *and they are, therefore,* ***an integral part of*** *a fairly stable ecology* (Walker and Richards. 1975:43-45. Emphasis of ecological terminology added).

This early narrative reflects an idealised overlaying of earlier humans on a developing aesthetic of the wilds in residual nature reserve ecosystems, and using this to engage with pressing man-induced environmental degradation outside and all around. Many developing narratives in these times are peppered with local indigenous knowledge discovered / reinvented in interaction amongst rangers and game guards in early racially differentiated conservation services in southern Africa (see Player, 1997).

These historical processes beg the question: Is our passion for the recapture of indigenous knowledge an outcome of utopian imposition that has developed to stereotype indigenous people within fantasies of wildlife aesthetics calling for new awareness through environmental education processes? There can be no doubt that there was and is a local, indigenous, naturalistic common sense. Much of this implicit, local knowing is said to have been lost in colonial struggle and is now being sought and made explicit in reflexive narrative. A growing fascination with the recapture / documenting of indigenous knowledge has emerged within political struggles. Developing narratives are thus entangled within the wishful ideals of struggle in hopeful and often stereotyping imposition.

### Stereotyping within utopian imposition

The utopian stereotyping of indigenous ethnic minorities, particularly aboriginal groups, is contested in some quarters, including first nations people themselves. A native American scholar reflected at a recent conference on culture and environment that a stereotyping of indigenous cultures and people such as herself as eco-centric and all good is as unwelcome and reality-incongruent as stereotypical impositions which paint them as backward and all-bad (Janse van Rensburg, 1997).

It is also often difficult to distinguish between utopian myths which endure due to outside influences and stories which may be rooted in earlier animistic mysticism. In a recent Australian text a first nations writer

(Mudrooroo in Gilbert and Webb, 1996) asserts that the famed multi-coloured snake of the dream-time is more a fantasy of anthropologists than an early social reality amongst Australian aboriginal peoples. In support of his observation it should be noted that the development and sustaining of an explicit unifying mythology such as that popularising aboriginal ecotourism today, would have been unlikely amongst the small, independent social figurations of old. He states:

> *Watjelas [Europeans] have studied us and have found that Aborigines all over Australia respect snakes, and they joined up all these stories about snakes and made something called a Rainbow Serpent* (Mudrooroo, 1996:33 Brackets added).

A utopian synthesising of indigenous eco-sensitivity has even been used as an economic stick to facilitate an imposition of sustainable environmental management through the interventions of international development agencies.

### Banking imposition for natural resource management

Texts reflecting this utopian imposition are to be found throughout colonial and modern Africa, but the theme only became clear once the concern was picked up within the narrative of the World Bank (see Dia, 1996). The process has been picked up by international commissions on sustainable development (UNESCO / UNEP) and now appears as a sincere colonising synthesis around indigenous knowledge, an objective intervention to optimise alternative environmental management systems with an African ethos. The trend of green-tagging interventions merits close scrutiny as an outside facilitative symbolic violence to sustain development and environmental management within the social engineering intent of international agencies.

In overview then, a recent popularising of 'indigenous knowledge systems' has been constructed as utopian imposition for and amongst the Other. What has not yet been mentioned is that utopian ideals have often been picked up amongst indigenous minorities as a feature of identity. These intermeshed trends have shaped an emerging common-sense perspective on the place of indigenous knowledge within environmental education processes of social reorientation towards a sustaining future. A demystification of developing assumptions about indigenous knowledge systems may well require a careful documenting of historical transformations. The revealing of myth is, however, often difficult to reconcile within strongly held imperatives for the indigenous and towards a restorative harmonising of humans amidst the pressing risks of current environmental problems.

## HISTORICAL FRAGMENTS AND TRANSFORMATIONS

### Earlier times of involved reciprocity

It is common to think that although things were different in earlier times, people experienced the world much as we do today, only they were closer to nature. This prevailing common-sense can be explained in part as modern people's individualistic identifying with characters in history and in part to the experience of how historical narrative often portrays the long-term as rational, unfolding continuities. It is thus often difficult for us to appreciate how much things and people must have changed over time.

Indigenous peoples are commonly ascribed with continuities that reach into an unchanging world deeply rooted in assumed rational ideals of nature's interdependence. Evidence in oral-tradition times do not point to rational eco-centric harmonies, but to socio-centric societies of shifting animistic mysticism. Palmer (1990) gives evidence outlining how San myth was rapidly transformed and entirely lost over a period of but seventy years. Indigenous knowing in earlier times was thus neither sustained, unchanging, out of the long-term, nor overtly located in a rational ideal of nature's ways. A sustaining fabric of myth was continually reconstructed within social experience and intent, rapidly forgotten in times of change where people were at the mercy of physical forces often experienced as the supernatural. Further evidence of difference and social change is found within narrative in/of life in earlier times.

### Windows in/on life in earlier times

Within the few windows we have on the day-to-day life experiences of early Nguni people as recorded in 'own words in the times', one finds humans living in a tight social world of obedience to communal sanction where things were done simply because that is what was done. On the use of fire to evade the Nagana cattle disease, thought to come where cattle eat in pastures contaminated by other large mammals, Magema writes:

> *Why this now, people do it that so, when cattle arrive at the place of others [a convention for `non-Nguni' denoting wildlife and other outsiders] they may not come to take their sickness (*Edgecombe, 1982:169. Brackets added).

Here, story steering life-in-times of involved [close] `naturalistic reciprocity' (Bauman, 1993:147) did not have or seem to need the explanatory logic and more object-congruent concepts that we share today. It is thus that people of the same intellectual capacities lived in a very different world in earlier times not long ago. Elias (1987:xxix) illustrates how an open-ended interplay amongst developing social processes of involvement and detachment shaped signified symbolic form and human orientation. These'civilising processes' came to encapsulate more object-congruent knowledge for coordinated steering choices amidst those more widely interacting figurations of humans within which we have come to be intermeshed today.

### Developing fantasy within utopian ideals

It is only relatively recently that we have invented and imposed our imaginings of unchanging indigenous knowledge as a deep seated sustaining logic amongst earlier peoples. Story, along with us, has thus undergone diverse processes of change amidst the rapid transformations of the last 100 years, particularly as local, colonial and historical review has meshed and mingled in the meaning-making melting pots of modernity.

Today one might distinguish between the mythical and story or indigenous knowledge and tradition, defining these and other propositions as opposing characterisations. All are, however, to be found intermeshed in developing processes of disembedding reorientation that lie behind much of our current fixation with things indigenous set against the exotic. A parallel to this process of alienation is to be found in a strongly held scientific disposition to non-indigenous, invasive plants, the unwanted, exotic and dangerous weeds. These plants are at the same time increasingly common-place, easily overlooked and in some cases, like wattle trees, have come to be ascribed with important utilitarian value in a local / indigenous setting.

Evidence in processes of indigenous story development takes one to a similar questioning of prevailing assumptions about indigenous knowledge processes as narrative has been changed and idealised in differing ways over the years.

### Taming savage stories within dreams of sylvian harmony

Since the Victorian era many of the oral traditions (stories) of Africa have been popularised as either quaint and somewhat primitive fairy or fire-side tales or as an otherwise lost legacy of indigenous knowledge. Prior to these transformations the stories were a dynamic part of the social world of everyday life. This is true of cultures around the world where stories are used by adults to direct, to inspire and even to terrify children into obedience. Estes (1992) illustrates how folk tales like those of the Brothers Grimm have been sanitised and transformed over the years, shaped in the case she examined, within the dominating life-world conventions of masculine and church.

Many of the stories of Africa were plucked with zealous savagery and enthusiasm from the context of everyday oral interactions and reproduced in written language. In this way early indigenous story and story sharing processes were transformed into something they were not. Many are stamped with the western notion of `the noble savage' and have developed as a powerful symbolic embodiment of this idea. The sustaining western civilising roots of this notion of sylvian harmony derive from developing landscape traditions, the Romantic era and modern utopian reflexivity. (See Elias, 1987 and Schama, 1995).

### Emerging myth of past harmonies

The metaphor of the noble savage has perpetuated two myths that must be exposed in any educational use of materials which claim to embody traditional/indigenous knowledge. Much of this was picked up in our developing story to be reimposed in hopeful fantasy within environmental education processes. This has shaped diverse perspectives where many have come to feel:

> that traditional peoples lived in conscious harmony with nature and that the stories contain some sort of deep purity of values that has somehow been lost, or

> that the unique and novel stories of Africa make Africans different and somehow 'lost,' often in a quaint/inferior way, and yet to be respected as others of `noble savage' ancestry, of purity and harmony, different and separate.

The compelling notions of `harmony and deep traditional values' and the contrasting messages of `primitive yet noble' create a myriad of overlapping and conflicting messages in traditional knowledge as it has emerged in environmental education today. What is an alienating mystique today was, for example, a repressive orientation in earlier times.

### Repressive narrative apart

Throughout African history indigenous peoples have been seen as primitive, loin-cloth-clad and noble children of nature who have somehow `lost their roots'. This developing message underpinned the notion of apartheid; separate but equal because different, and to be respected, but seldom treated so. Many stories are rife with these contrasting notions that typify indigenous people as the noble but lost children of nature (see Schama,1995).

### An inverting hinge in liberation

The notion of noble solidarity around lost indigenous roots has also been, in an inverted form, a narrative within the struggle for freedom. This has developed as a somewhat ambivalent perspective in civil society and as a mobilising call within a more recent liberating wave of colonising institutions seeking to legitimise their functions in a changing society. The former was more-often-than-not embedded in a diverse rhetoric of mobilising solidarity of freedom movements and the latter has developed alongside and after liberation as in the earlier case of the World Bank.

Recently, within this inversion amongst opposites, the `lost and primitive' are the children of a Western colonial mentality. Here traditional stories and indigenous knowledge in/of Africa and elsewhere have become a repository of rejuvenating wisdom within which to seek reorientating truths so as to escape pressing webs of risk within modernising trajectories. As is often the case in narratives amongst opposites, conservation agencies and community-based and non-governmental organisations have used developing feelings around things indigenous to change the ethos of game parks or to mobilise constituencies against residual `colonial conservation'. The 'Parks and People' process of the Wildlife and Environment Society of Southern Africa (Curruthers and Zaloumis,1996) gives a sense of developing tensions as webs of shifting, wistful myth portrayed in an idealised manner as idealised fact in utopian relief around questions of social justice and sustainability. Similar decontextual abstraction and inversion in orientation is also to be found within developing processes of story telling.

### Disembedded role reversal

The story teller, too has been 'yanked' out of the shifting context of traditional oral interaction and shaped as an icon/sage, carrier of the capital of wisdom that is somehow transferred through story to construct the value frames that enable tribes and culture to be perpetuated.

In Nguni society of the last century the primary story teller role resided with women. In developing wildlife stories amongst men exploring indigenous wisdom in the wilderness of nature reserves, one now finds the roles reversed as old men emerge more prominently as indigenous story tellers within tales of sustainabilities lost. From a relatively minor and later story-telling role within rites of puberty, old men are now upheld as sources of an indigenous sustaining myth lost to the youth in South Africa. The *Imbewu* project of the Wilderness Leadership School (WLS) is an example of a reorientating transformation where new sustaining narratives of old are shaped in developing interactions re-embedded in life-world orientating wilderness experience desired for our youth (see WLS, 1996 and Player, 1997).

Research processes, too have had 'reshaping effects' as transforming generalisations and idealisations of sustainabilities past have been reconstructed within webs of rationalising narrative.

### Research and further somewhat blind transformations

Academic research and curriculum development processes have added legitimacy to indigenous knowledge endeavours, effecting a further series of transformations that often remain unexamined in developing narrative trajectories. Common within these is often a presupposition of 'indigenous harmonies lost' set against Western intrusion. These processes have shaped an implicit interpretative lens of indigenous harmonies that lie shaping and unexamined behind:

> retrospective psychoanalytical research to illuminate the collective unconscious and developing psyches of 'suppressed and underdeveloped' peoples (Gambini, 1996);
>
> socially critical academic research seeking rational institutional transformation for restorative justice amongst rural peoples living adjacent to natural resource areas (see Davion, 1996 and O'Donoghue, 1996);
>
> survey research to document indigenous knowledge systems for improved rational strategies of natural resource management (see Thakadu, 1997), and
>
> a tetrahedral model for indigenous ways of knowing as opposed to a Western world view, and an emerging Alaskan curriculum development framework for / amongst indigenous cultural groups and general education. (See Kawagley, 1995 and Alaska Frameworks, 1997. We are grateful to Kathy Stiles for drawing our attention to a globalising trajectory of such North American indigenous knowledge processes reaching into Africa amidst development aid programmes.)

Transformation and error must accompany disembedded transposition, process-reducing generalisation and emerging grand narratives within continuing academic and curriculum research. Strongly held moral and spiritualising imperatives of religious ideological proportions make a clarifying engagement with much of this research a somewhat hazardous endeavour. A careful examination of presuppositions and disembedded academic rationales might, however, enable a questioning review before the blind rush of utopian fervour develops an ideological momentum within a narrowing symbolic violence of much rational academic endeavour.

**An example of African post-colonial reappropriation**

Revealing, in the African community development example that follows, is how a post colonial reflexivity can shape a narrative of reappropriation where ambivalence is scattered amidst the displaced retreat of colonising outsiders. Mr Gunge reflects within a 'reappropriating reviving' of indigenous knowledge that:

> *"I can say that the old [colonial] system destroyed not only our people but our spirit and knowledge. We were behaving as if we never used to think before these people came. The helplessness got worse even before we got independence. There are those who are said to know everything, and those who are said not to know anything. We in villages like Chomuruvati are seen as knowing nothing because we are poor and get drought relief. So those that give us things threat us like that and we let them do it. IT [Intermediate Technology] reminded us that there are many good things that we knew as Africans, and we went back and looked and said, 'ah we are so clever!"* (Win, 1996:31)

This felt/experienced narrative illustrates a clearing away of ambivalence and a reappropriating orientation facilitated amongst rural peoples. Murwira reports as facilitating agent within a change from past coercive, dispersive erosion works to modern permaculture moisture trapping techniques that:

> *it was evident that the farmers knew much about their own land and how to manage it. It was just that they had not been given the chance to express and share their knowledge, not only with one another♠♠ but with 'the experts.' I remember particularly one of the discussion meetings when I asked about traditional pesticides. There was one farmer whose tomatoes were never attacked by red spider-mite. But he could not (perhaps a context of 'would not' in a sense of 'could not bring himself to') tell anyone what he was using. He was probably afraid of being laughed at and even being accused of not using 'modern-methods.' Gradually as we talked and shared information and everybody felt at ease to share what they knew, he told us that he used the sap of a local drought-resistant aloe."* (Win, 1996:33, brackets added)

Note that it was mandatory for farmers to buy seed, fertiliser and chemicals to get a state loan for tomatoes, an introduced, high-return cash crop to be grown according to modern methods through colonial agricultural extension processes. Farmers not using pesticides to 'expert recipe' or selling them to turn a quick profit could be expelled from a cash-crop irrigation project. In the early tradition of using charms and concoctions to protect crops (see Van Onselen, 1996) an effective repellent seems to have been invented in this case. The interactive process of cooperative engagement suggests a useful empowering re-invention of indigenous knowledge in transforming ways. Here, indigenous knowledge is that which arises as local knowledge to be more widely shared, and assumed to have consciously pre-existed in this state as a wisdom of long ago, now somehow retrieved and revalued.

### From ethnic uniqueness to common-sense knowing

Note here the beginnings of evidence that indigenous knowledge is not some pre-existing ethnic wisdom re-discovered, but knowing that might arise within processes of engaged meaning-making. In the example, sedimented common sense is mobilised in the co-shaping of locally useful knowing that might sustain and steer life-world choice in developing communities. This perspective may be useful for dispelling much of the prevailing myth on indigenous knowledge and illuminating a central place for processes such as this in environmental education initiatives.

The question of the legitimacy of story and story teller within transformed contexts is central to indigenous narrative all over the world. The diverse changes of narrator and story might best be seen as open-ended or 'natural' socio-historical processes that have been part of shifting/shaping that has constituted the ways we see the world today. Past and prevailing ideological blinkers must thus be taken into account at times and revealed at others if we are to make use of this material in environmental education processes.

The history of southern Africa, in particular, raises questions about how much of this material has been used as tools within social processes of repression and liberation. The twists and turns in indigenous story narratives thus leave us many vexing challenges today. Ethno-ecological knowledge/traditional story, in whatever shape or form, is fraught with ambiguity, danger and diverse challenges. However, one does not have to encounter or use stories much to realise that they are also compelling and powerful resources in everyday teaching and learning situations.

## CHALLENGES IN DEVELOPING STORIES TODAY

### Restoration of a lost fire-side wisdom

It would be naive to suggest that the indigenous story is a thing of purity and deep meanings that speaks for itself. When it was plucked out of everyday life to become an object it both lost its voice and came to carry differing meanings. Since then it has become the vehicle and the voice of much confusion, suppression and struggle. It would be equally naive to suggest that we can restore the voice and freedom to story by returning it to the oral fire-side or by holding on to indigenous 'facts' in socio-ecological context of experienced validity.

Paradoxically, what we have and experience as indigenous myth, story and knowledge today is not something that was ever there in earlier times. This ambiguity does not, however, in any way diminish what might be experienced as knowingful insights. It simply dispels a mysticism of recaptured freedom of old and lays out some of the challenges we face in environmental education processes today. A key concern is the realising of 'indigenous' in a curriculum for orientation in the challenging story of developing environmental risk in the present.

### Living with an opening elegance in disruptive ambiguity

It would be perpetuating the myths of apartheid suppression to ascribe greater truth to `traditional' story / indigenous knowledge against story / knowing that has elegance and strength in the diverse contexts of everyday social life today. What, therefore, do we do with this compelling aberration?

Seen as an outcome of co-shaping engagement, one develops respect for different ways of knowing without falling into the trap of upholding one over any other. This opens a relativist trap amidst paradigms or opposing cultural world views, but grounded engagement might mediate a tendency to utopian fantasy with no evidence in developing social history. In engaged meaning-making within socio-historical context one can find somewhat harsh evidence of life in earlier times. This is often difficult to accept when it departs from an idealised wish list of ideals and valued aspects of indigenous identity that have come to be ascribed with status today.

If we use these issues and other anomalies identified in this paper to strangle the notion of indigenous knowledge, we lose untold riches of ambiguity-provoked meaning-making struggle. If, on the other hand, one grapples with harsh realities of past and present, becomes skilled at not being taken in by myth or being led astray by compelling lies, one might find useful reorientating insight. We thus advocate living with the challenging ambiguities of indigenous knowledge processes, embracing these with scepticism, eyes wide open and absorbed by the challenges they cast before us.

Collecting, investigating and using the diversity of materials that present as traditional stories / indigenous knowledge within environmental education programmes has given rise to approaches that are proving useful. One of these is using indigenous knowledge materials as a tool for revealing myths and unpacking stereotypes and cultural misconceptions in the common-sense logic derived from and imposed upon many traditional practices. These images might have use as a `mirror' for reflecting on the way we live today.

## TOWARDS AN OPEN-ENDED SYNTHESIS

Bauman (1993:196) cautions that in technical re-skilling processes where communities attempt to reappropriate powers lost to specialist institutions within a modernist technological sequestration of indigenous knowledge, the processes become very different from what they were, the game changes. Popularised empowerment is thus not a simple matter of communities resuming collective responsibility around a rediscovered indigenous knowledge providing renewed, locally rooted wisdom for sustaining steering choices in everyday life.

### Epistemological processes revealed with hindsight

It is somewhat ironic that social processes of interpretative insight and explanation arose to run parallel and detached within colonial appropriation and an accompanying technological sequestration from/amongst indigenous peoples. This has shaped an experience of knowledge as facts that reside in institutional information systems. It is thus that knowledge has become a commodity in the hands of professional bureaucrats who seek to steer others in the business of life. A levelling of the power gradient is bringing us back to knowledge as arising common-sense, within which the sedimented symbolic capital of institutional wisdom and everyday-life experience might interact in useful ways to provide the social reorientation for / within this century. It is within this open-ended model of process that indigenous knowledge has come to be seen as a human sense of knowing in context, shared in community amongst others, and arising in sustaining struggles to steer orientation and activities in socio-ecological surroundings. Much of this may require a sustained inter-epistemological discourse as amongst institutional science and everyday common-sense struggle, argued for by Beck (1992) in his *Risk Society*.

Within all of the myth, mysticism and politics of indigenous knowledge processes is a fairly common-sense and open-ended epistemological image of our coming-to-know with shared insight and an excitement for what one discovers and finds useful. It is still fairly difficult for us to accept that within and around a sedimented conventional wisdom held within a shared symbolic capital in/of everyday life, *knowledge picks up from the point of breach, disruption, mis-understanding* (Bauman, 1993:148). Down the generations shaping us in/and our world there arises a developing and shifting symbolic capital as the tools for the job in diverse inter-epistemological social process where figurations of humans derive sustaining social orientation arising in/as/from a naturalistic common-sense around which we differentiate meaningful knowing. We are steered within our surroundings and the company we keep and often feel compelled by knowing that arises with sensational resonance within the symbol games we play in the steering struggles of everyday life (Elias, 1991).

Within these processes, indigenous knowledge situated in 'shared-arising' spiritual feelings may shape fantasies that lose sight of the common-sense in an open-ended differentiation of meaningful steering choices within compelling myths of/for sensational spiritual rebirth. Thus indigenous knowledge might develop an icon-like orientation within a political rhetoric of reconstitutive freedom as apparent in much of the symbolic violence in/of oppositional discourse on indigenous knowledge systems today.

With hindsight the open-ended processes of coming-to-know-in-context are, however, fairly clear and simple. All processes of indigenous knowledge meaning-making were laden with shaping tensions in the course of involving events when the naturalistic stream of knowing what is done is disrupted. Nel [Pers comm] notes that this naturalistic everyday knowing is a simple matter where we 'turn on the tap and water runs out'. It is, however, the cases where we 'turn on the tap and the water doesn't run' that have us re-search to tap the symbolic spring for new resonant knowings that might arise and flow in the stream of continuing steering in/of everyday life.

As disruption in flow had us reach around and down within the intergenerational symbolic capital of story and felt experiences of old, so we came to construct more congruent shared knowing, in the pattern of humans sharing social space for many generations. Our sensational insights would have opened the way for mysticism were it not for a detachment that stood us on the rising spiral pathway of meaning-making we had painted along and down the generations in the reconstruction of a recaptured common-sense to steer us within the disruptive risks in/of everyday life (Elias, 1991).

This text resides within the fabric of myth we humans have differentiated in our relatively blind ways amidst intergenerational stumblings that have placed us within the risky world we share today. Environmental education processes have emerged as an engaging prospect where new ways out of old knowing might arise within this open-ended journey.

### Open-ended processes shaping new ways out of fragments of old knowing

Despite the complex issues involved, environmental education programmes might well explore story, historical patterns of daily life and traditional healing to reveal much of the common sense logic of earlier indigenous knowing. This may enhance the value of lived experience and enable participants to engage in reflexive social processes that foster positive cultural change. Here culture is seen as that which humans have in common and as diverse socialised world views that needs to be reconstructed if we are to share a more just and sustainable relationship in the environment.

San common-sense myth appears to have been continually reinvented in tight animistic processes of everyday family life. Nguni people have, as is the way in oral tradition, all but forgotten indigenous common-sense on the Nagana cattle disease by the mid-19th century after its successful control generations earlier within mobilising hunts to drive out large game species (O'Donoghue, 1996).

Lynette and Rob had a searching experience in a process of `remembering-in-the-making' when constructing an Nguni grain pit. Guided by Skhakhane, an older Zulu colleague with childhood memories of early life in Zululand, we became involved in trying to work out how to construct the pit. Skhakhane assembled convincing memory fragments for a trial-and-error experience until a resonating 'ah-ha!' gave us a feeling of common-sense knowing reaching back into earlier times.

The best example of this somewhat ad hoc reinventing process was his suggestion to line the pit with clay. This was thought sensible because it was assumed that the fire would bake the clay hard and dry, but it merely shrank and cracked. The next suggestion was to use termite mound clay which is not prone to shrinkage and a deepening 'ah-ha' developed amidst the assumption that the dung and termite secretions acted as successful bonding agents. Skhakhane was very relieved and proud of the outcome, as were we all, realising that the idea of clay had been a blockage to the truly workable common-sense in the termite soil, immediately ratified by other sources. This exposes the process as a constructive reconstructing in a social context.

We were later to 'find out' that the residue of dung and wood ash was an abrading inhibitor of micro-organisms like weevils, tearing their soft exoskeletons. This snippet of deepening insight was added to a sedimented naturalistic 'knowing' within indigenous knowledge processes, almost certainly 'unknown' in earlier times, but none-the-less done in the common-sense way of doings sustained by a goodly amount of mediating communal coercion.

In this engaging process of indigenous knowledge `retrieval / reconstruction' we were immersed in a shared common-sense seeking that had practical resonance and historical authenticity.

### From mystical novelty to common-place common-sense

It was thus a doing and documenting of emerging evidence in shared experiences such as these that prompted Lynette to observe that all sustaining common sense located in the struggles of everyday life has the character of indigenous knowledge. There may thus be a central place for reflexive puzzlings to reinvent new ways of knowing of old within processes of environmental education problem-solving. The constructive mobilising of local/indigenous knowledge as sustaining common-sense in shared struggle might well be given a central place as key processes of environmental education towards a sustaining future. Out of fragments of common-sense and story reconstructed in context, it would appear, come reorientation and steering tools in the present, and one could call this indigenous knowledge, processes of knowing in socio-ecological context.

This may well be more useful than a continuing oppositional politics of knowingful power that still places the indigenous in Africa and elsewhere in opposition to the Western in continuing symbolic violence of superiority. Being locked in perpetual oppositional struggles has added little to a sustaining common sense in our land. The Share-Net Indigenous Knowledge Series might well expose this false opposition against the struggle for a common-sense synthesising wisdom that arises amongst people in shared struggle amidst the environmental problems that confront all indigenous to this planet.

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# Environmental science and rural development: the case of the curriculum of the School of Environmental Sciences, University of Venda

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An abstract for a paper to be presented at the International Conference for Environment Educators, 23-26 March 1998. Pretoria, South Africa.

## Abstract

Environmental Sciences is to date a well established field of learning. But because of its recent growth, there is often wavy concensus about its nature and the principles that should inform curriculum development.

Existing literature identies environmental science as both a theoretical and an applied science. As a theoretical, Environmental Sciences endeavours to promote the study of the processes of the natural environment in order to gauge the resource potential and the susceptibility to all forms of disturbance to the biophysical environment.

Its applied aspects link environmental sciences to the analysis of the impact of the development process and of the natural changes in the nature of the biophysical environment. Those impacts interfere with the long-standing relationships between people and natural resources by directly affecting the capacity of the biophysical environment to support life and human functions, services and aspirations.

Obviously this is a mammoth responsibility for a single field. No wonder therefore that the field will often exist in tension with hitherto well established fields in the traditional natural and applied sciences.

The School of Environmental Sciences established at the University of Venda in 1994 has attempted to put into gear and action those objectives of Environmental Sciences. It pledges in its mission statement to provide professional training to graduate students of the School at all levels of university education and to undertake applied research that links the University of Venda to its hinterland community. The distinguishing character of this School will be its ability to evolve and inculcate in its graduates an integrated approach to the management of environmental resources for sustainable development.

The specific aim of the school of environmental sciences is to develop strategies and policies that will restore, enhance and maintain resources in such a quality and quantity that resources will remain beneficial to the present and future generations. By adopting an interdisciplinary approach, the major goals of the school will be manpower training and applied research in environmental science. The object of manpower training and applied research is first to understand the nature and characteristics of the "natural"and human environment and second to apply that understanding to analyse and evolve strategies and policies that promote sustainable development of resources.

On the basis of its mission, aims and objectives, the School developed an interdisciplinary curriculum around four pillar departments. The 4 departments are:

1 Department of Earth Sciences
2. Department of Geography
3. Department of Urban and Regional Planning and
4. Department of Ecology and Resource Management

In the conceptualisation, the school observed that an Environmental Sciences programme must

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(1) Analyse the characteristics of the natural environment in order to assess the resource potential.
(2) Analyse the human environment in order to relate the resource potential to human demand.
(3) Establish a planning process for resource development.
(4) Establish mechanisms of assessing the impact of the development process on the environment and the strategies to maintain, enhance the sustain these quality of the natural resources.

Because the university of Venda is located within the heart of a rural community, the curriculum of the school gives much greater focus on the management of natural resources. Issues of environmental pollution are seen to be more important for curriculum in urban universities rather than for rural universities.

The curriculum also addresses two other issues:

(i) how to phase in interdesciplinarity in a practical sense
(ii) the job market relevance of the curriculum.

This paper presentation therefore seeks to expose the thinking underlaying curriculum development of a relatively young school of Environmental Sciences. The hope is that the paper will provoke discussions and provide important feedback for our on-going curriculum development effort.

# Environmental education and research in teacher education in Finland - different aspects and future visions

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*Abstract*

Since the beginning of the 1970s, different attempts have (repeatedly) been made in Finland to develop environmental education in schools and in teacher education regarding content and methods in relation to the teaching aims. In practice, the rate of development has been slow and uncertain, there has been virtually no connection to research, and the applications have varied according to the particular initiatives and interests of the individual schools and departments of teacher education. The alternative line in education offered by the Department of Teacher Education of übo Akademi University, i.e. *the line of environmental education / environmental pedagogy* (160 credits) for class teachers-to-be, is presented as a new and innovative alternative aimed to improve environmental education in all teacher education. The research work in environmental education has already been initiated at the department and the fundamental plans for the environmental education research programme are presented as an interdisciplinary project on *Environmental awareness and behavioural conflicts*- a comparative study of the effects of teaching methods and cultural traditions on environmental awareness in the Nordic countries *arranged as a network research programme in the Nordic countries*.

**Key words**: *environmental education, environmental pedagogy, teacher education, interdisciplinary environmental education research.*

## 1. Introduction

Since the beginning of the 1970s, there have been attempts to develop interdisciplinary thinking regarding environmental issues, the aim of which is to foster awareness of and concern about environment. It was then realised that in order to achieve that purpose, knowledge about nature was not enough. Since then several working groups, appointed by e.g. the Ministries of Education and Environment and the Unesco Commission of Finland, have made (repeated) proposals and recommendations in the form of committee reports and memorandums of suggested steps of developmental action. Some of these recommendations have fallen into oblivion, others are still at various stages of planning, wheras one or two have already been implemented. In all, the rate of measures taken is and has been very slow and uncertain.

Below I will first present a short historical review of earlier developmental plans and recommendations as well as the present situation regarding environmental education in teacher education in Finland. I will then outline the new alternative line in education offered by our department as far as environmental education is concerned, our research connections and our plans for a Nordic network within environmental education.

## 2. From nature preservation to environmental education

Up to the 1960s, educators confined themselves to the teaching of the preservation of the natural environment. In the 1970s, the teaching content was extended to include environmental conservation and protection as well. At the same time as the contents were extended in terms of knowledge and skills, the subject taught was first called *education about environment* and later *environmental education in terms of education for and through environment*. Environmental education came to include not only natural habitats or environments but also built environment and social environment (4). The concept of environmental education was established at the environmental conference in Stockholm in 1972, making the Nordic countries forerunners in the development of environmental education even before the Tbilisi Conference in 1977 (2). In Finland the concept of environmental education was introduced in the middle of the 1970s (8).

A couple of years prior to the establishment of the official term environmental education, steps had been taken to develop environmental education in the Finnish educational system into a more holistic direction. The aim of environmental education was to give an overall picture of the interrelationship and interconnectedness existing between man, society and natural systems. Environmental education was to include the teaching of *knowledge* as well as *skills* and to create positive *attitudes* and *action competence*. Environmental education was to be *life-long education* and *thoroughly permeate all teaching and education* (3 & 4).

At the end of 1990, the Unesco Commission of Finland appointed a working group the purpose of which was to propose a national strategy and activity plan for environmental education before the end of May, 1991 (7). This strategy mainly concentrated on the different subsections of the educational system in so far that the working group noted that the central problem areas in environmental education were in *curricula, teaching materials, teacher education, research, the division of responsiblity, and resources*.

## 3. Environmental education in teacher education

### *3.1. Background*

Teacher education in Finland was incorporated into university education at the beginning of the 1970s. The scope and contents of environmental education has varied very much in different departments of teacher education. Its implementation has depended both on the attitudes of teacher educators to environmental education and their proficiency in incorporating environmental aspects into their teaching. As early as in 1978, a compulsary course in environmental education was recommended to be included in the general studies of the basic education programmes for all teacher categories. Furthemore, the subject-related studies (for subject teachers-to-be) were to include studies of environmental issues, approched from the *specific point of view of each particular subject*. Moreover, teacher students of all categories were to be encouraged to use in their practice teaching methods pertaining to environmental education and co-planning of integrated projects as well as *teaching strategies* which were more pupil-centred and experimental or which were to take place outside the classroom (3 & 8).

The Commission for Education of Environmental Protection also emphasised the importance of the development of teaching methods in such a way as to place the main focus on *ethical and moral goals and purposes* and to give teachers proficiency to teach about how *decision-making in the community* could be affected. The commission presented a proposal to the effect that basic education in environmental control and training in the fundamentals of sustainable development be given to all students and the working population so that their education could be implemented in their own vocational branches (5).

### *3.2. The situation in teacher education today*

It seems as if the proposal of the working group has not gained enough hearing in the reforms of teacher education programmes, either. On the contrary, the compulsary courses in environmental education have in fact been removed from the general studies in most degree programmes. A look at programme syllabuses and university handbooks shows that environmental education is now included to very different extents (1-35 credits) and under a variety of names as either compulsory or optional courses in the departments of teacher education or as continuation courses for teachers. The objectives of environmental education in all subjects and teacher education programmes have by no means been fulfilled yet.

In order to promote environmental education, the Ministry of Education funded a project entitled "The Environmental Education Programme for Teacher Trainers" (1994-1996). The project involved training in all twelve teacher training units in nine universities in Finland, which educate primary and secondary school teachers. Teacher educators were identified as a critical target group, as they were thought to be the key people in producing, implementing and spreading new practice (6). This group was planned to include professors and lecturers in university teacher education departments and teachers in university practice schools, and also to represent all subject areas. The result, however, was not the expected one, i.e. not all teacher educators could be persuaded to incorporate environmental education into their teaching. There were many reasons, the main ones being lack of time, interest and attitudes on the part of teacher trainers to participate in an extra, very time-consuming study programme in addition to an already much too large work-load in each unit.

### *3.3 Environmental education at the Department of Teacher Education at übo Akademi University*

The Department of Teacher Education in Vaasa is the only Swedish-language university in Finland. Thus it has the overall responsibility when it comes to the educating of all kinds of teacher categories, ranging from nursery-school teachers to vocational teachers. The main categories, however, are class teachers and subject teachers.

So far, environmental education has been included in the degree programme for class teachers only sporadically. In addition to that, graduated class teachers have been given the opportunity to participate in short continuation courses (2-5 credits). In order to expand the scope of and to develop teaching and research in environmental education, a general plan for an alternative line in education was approved by the university in 1997, *the line of environmental education / environmental pedagogy*(160 credits) (Appendix 1).

Environmental education thus emphasises an *interdisciplinary, holistic approach to environmental problems with the focus on learning and teaching strategies*. Environmental education in other words attempts to influence the pupils‚ cognitive structures, learning processes, metacognition, values, attitudes and emotions. Successful methodological strategies which motivate and activate the pupils, are at the same time factors which are important when it comes to the creating of the pupils‚ environmental relationships (1). The learning process is connected with the life situation of man. *The individual life style* and an analysis and evaluation of its effects on the environment increases man‚s knowledge about environment (7).

In practice this means that a group of students have education as their main subject, but instead of mainstream education they concentrate on environmentally-oriented education. Class teachers who have chosen this alternative probably constitute an attractive option particularly with *special environmentally-directed schools* or with *schools offering special environmental lines* in their programmes.

The line of environmental education includes three different types of courses according to the following principle and scope: a) general courses aimed at all class teachers-to-be, b) courses with general lectures for all and specialised environmentally-oriented exercises for environmental educators-to-be, and c) specialised courses in environmental education (for an outline, see appendix 1). The thematic unit *Natural and built environment* will thus be dealt with from the point of view of each subject in the course "didactic subject-related theory". The students choose at least one of the following minor subjects: biology, geography and science. The subject-related studies in environmental education consist of three major modules: *outdoor education* (all courses include methodological as well as didactic aspects on practical school teaching in issues concerning environmental education), *environmental education* (which includes e.g. the theory of environmental education, integrated thematic units, didactic theories and research in environmental education as well as didactic developmental work within an environmental-educational, curricular-theoretical framework) and *teaching strategies*/didactics/teaching practice *with an emphasis on environmental education in ordinary schools and environmental schools. Students who aim at only 120 credits, e.g. a Master of Education degree for nursery-school teachers, write a Master's essay (4 credits) in environmental education.*

Advanced studies in environmental education also consist of three major modules: *theories in environmental education* (which includes curricular theory with its main emphasis on environmental aspects during exercises, environmental philosophy and environmental psychology), *applied environmental education* (practice periods with their main emphasis on scientific and interdisciplinary didactics as well as environmentally-oriented units) and *research in environmental education* (including quantitative and qualitative research methods, exercises involving applications in environmental education, and a thesis (project studies) in a project in environmental education). Postgraduated studies are also possible in environmental education.

## 4. Background, state of the art and future visions in environmental educational research at the Department of Teacher Education of Ûbo Akademi University

Only a few minor research projects on *the effects of environmental education on pupils'/citizens' environmental behaviour* have been conducted in Finland. No larger-scale investigations still exist concerning the effects of different teaching methods on environmental knowledge, attitudes and behaviour in spite of the fairly large number of environmental happenings that have been carried out in schools.

At the Department of Teacher Education, the research project on *Environmental awareness and behavioural conflicts- a comparative study of the effects of teaching methods and cultural traditions on environmental awareness in the Nordic countries* has started with small financial and personal resources. It was therefore natural to plan for a Nordic research network which can apply for financial support from Nordic and European foundations. So far our co-operational planning involves different teacher education units in Finland, Sweden and Norway. Negotiations with teacher education units in Denmark and Iceland are in progress.

### *Objectives and basis of the project*

In many cases people½s environmental awareness (seen as their knowledge and attitudes) is not reflected in their behaviour. The objective of the present project is to study the characteristics of such knowledge and attitudes that have great impact on human behaviour and to develop learning and teaching methods/strategies that lead to such environmental awareness in pupils. *Methods of evaluation* which are adapted to the teaching methods are also needed. Behavioural conflicts are investigated in relation to previous research on behavioural conflicts in other human contexts and in relation to the unique in a situation of global catastrophe.

### *Research methods and subsections of the project*

The project consists of three subsections. Within the first subsection, *comparative attitudinal and behavioural research with respect to environmental education as a thematic unit in schools and universities* is conducted among teachers in primary, secondary and upper secondary schools, teacher educators, student teachers and teachers in other educational institutions. The second subsection consists of *comparative attitudinal and behavioural research involving children of all ages* and includes longitudinal investigations as well. The possible difference between the environmental attitudes and behaviour of pupils interested in information technology compared with pupils interested in environmental issues is also investigated. Furthermore, in addition to love of nature, the possible connection between a true knowledge of nature and active environmental awareness/environmental-friendly behaviour is also investigated among modern youth. The conflicts between attitudes and behaviour at different ages, their origin and causes (environmental psychology, cultural traditions and differences), constitute another sphere of interest. The third subsection comprises *comparative studies of teaching methods and strategies as well as teaching materials in the development of environmental awareness and environmentally-friendly behaviour.* Thus the importance of experiences in nature and experiental learning for teaching and learning is investigated, as are the effects of outdoor teaching and learning and outdoor environmental education on pupils relationship to/empathy for nature, animals and plants (as well as other effects/factors concerning outdoor education, such as leadership, group dynamics, knowledge of species, knowledge of ecology, concept formation, misconceptions). The effects of special teaching programmes in environmental education on attitudinal and behavioural changes as well as special working methods in order to develop pupils thinking abilities and action competence in environmental issues are also under investigation. An interesting question is how environmental education could be developed using outdoor education in combination with modern information technology. Moreover, risk assessment and its consequences on teaching in environmental education is a so far uninvestigated area.

Both quantitative and qualitative (and a combination of the two) *research methods* will be used to secure measuring instruments which are parallel and adapted to the situation, e.g. questionnaires, interviews, observations (such as participating observation, field observation, qualitative observation, direct observation, field investigations), analyses of essays and drawings as well as case studies.

## 5. Conclusions

In order to be successful with environmental education in teacher education, the same principles apply as for environmental education in schools. An *interdisciplinary* approach in environmental education requires co-planning and co-ordination of content, timing and methods of both programme syllabuses and the courses themselves. In addition to flexibility in timetables, *co-operativeness* and *positive attitudes* as well as *skills* are required from individual teacher educators representing different subjects, so that they are capable of grasping the special characteristics of each subject in relation to environmental teaching. Here teacher education has an important role to play.

The fact that learning ought to be assessed continuously in relation to the teaching and working methods used, should be self-evident to both teacher educators and teachers in their professional work. Co-operation in environmental education research between different university teacher education units provides opportunities for larger, interdisciplinary and overall projects which include both teachers/researchers and post-graduate students/doctoral students. Using an environmental network and the most recent information technology, innovative thinking and results would spread effectively and be applied nationally as well as internationally towards a more environmentally-friendly life style.

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## Appendix 1:

EDUCATION, the line of environmental education/pedagogy for class teachers-to-be at the Department of Teacher Education at ûbo Akademi University

**A. Outline of the programme** (160 credits)

1. Studies in language and communication (10 credits)
2. Education (15 credits)
3. Didactic subject-related theory ( 39 credits)
4. Minor studies (2 x 15 credits, at least one of the following: ***biology, geography*** or ***science***, 30sv)
5. Subject-related studies in ***environmental education/pedagogy*** (20 credits)
6. Advanced studies in ***environmental education/pedagogy*** (40 credits)
7. Optional studies (6 credits)

### B. Detailed plans on environmental education/pedagogy:

| 20 credits | *Environmental education/pedagogy** | |
|---|---|---|
| Module 1:<br>**Outdoor education** | Module 2:<br>**Environmentl education** | Module 3:<br>**Teaching strategies/Didactics/Teaching practice** |
| 1. Outdoor education (5)<br>- field studies in biology, geography, geomorphology, adventure pedagogy, camp school<br>2. Didactic theory/ environmetal teaching | 1. Environmental teaching in integrated thematic units, seminars (5)<br>2. Research methods/ environmental r.m.! (3) | 1. Practice/ environmental issues (4)<br>2. Comparitive pedagogy (1) |

(& Master's essay, 4 credits, in environmental eduction/pedagogy)

| 40 credits | **Environmental education/pedagogy, advanced studies** | |
|---|---|---|
| Module 1:<br>**Theories in environmental education (7):** | Module 2:<br>**Applied env. education (11:)** | Module 3:<br>**Research in environm. educ. (22):** |
| 1. Curricular theory with emphasis on env. aspects (3)<br>2. Env. philosophy (2)<br>3. Env. psychology (2) | 1. Pratice periods (3X3 + 2), with emphasis on env. teaching | 1. Quant. = qualit. research methods/ appl.environm.m<br>2. thesis/project studies in EE |

# BORDER CROSSINGS IN ENVIRONMENTAL EDUCATION: backing the best of both worlds

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**Abstract**

Since introducing a distance education MA in Environmental Education in 1993, I have become interested in how students, whose cultural contexts and environmental problems are quite different from my own, respond to my interpretation of environmental education. Aware of the ambiguity and chance use of the term 'culture', I begin by attempting a definition. Secondly, I reflect on how it is that the current eruption of interest in distance education is likely to ignore students' needs unless course materials are relevant to their professional needs and environmental concerns. Following this, I argue that environmental education students need to feel a sense of 'social belonging' that encourages critical reflection about their practice. Reflective practice should lead to the empowerment of students to act for environmental improvement in their own communities. Next I look at how the language of development presents difficulties in balancing local interests with external pressures for sustainable development and to conserve biodiversity. Finally, I propose that environmental educators in both worlds should strive to understand each other's cultural and environmental circumstances rather than assume that a common approach can be found. In order to explore these interests, I draw on my students' reflections about environmental and social issues in their different local contexts.

> At the beginning of the module ... all I expected was to get straightforward instructions on environmental education as is the case with other subjects. As I continued things started unfolding and I came to realise that the way you think, behave and treat your environment depends on your prevailing ideological convictions. Thus our behaviour is conditioned by the values which structure our everyday experience of living and the practical issues and concerns which emerge from such experience.
> (Jamaican student, Thessa Smith, reflecting on the first module of the MA in Environmental Education course)

## Defining culture

At the heart of this paper is the question of how environmental education materials produced in one cultural context are perceived by students in another. This is not just a question for distance educators, but for all those environmental educators involved in programmes that cross cultural borders. In pluralist societies, cultural differences are often as pronounced as they are between societies. Before continuing, I want to say a few words about the meaning of 'culture'. It can relate to ways of life, the arts and media, political or religious culture and attitudes to globalisation (King, 1991). Since culture is to do with human identity, I would like to make the following two distinctions. Firstly, there is the older (anthropological) view that 'a culture' is a self-contained group, in which people have a sense of belonging and continuity. In this sense, culture is something that is 'authentic' and worth preserving from one generation to the next. It is a view favoured by 'postmodern' environmentalists who reify indigenous knowledge as the only knowledge that matters for sustaining environments in the belief that local people know much more about their environment than do 'outsiders'. Moreover, postmodernists' belief in truth and reason being a local matter is "used to discredit the classic top-down, centralised, science-led development model that grew out of the colonial model" (Blaikie, 1996). However, the idea of cultures as self-contained groups of people passing on their cultural heritage as a distinctive identity might be oversimplifying culture since it assumes that individual differences are unimportant and ignores the realities of cultural change. This is a view of culture which Popper (1994) refers to as the "the myth of the framework".

Secondly, there is a view of culture that Kuper (1994, quoted in Burtonwood, 1996) refers to as "'high culture' with a cosmopolitan emphasis on the evolutionary growth of knowledge and reason". I believe that 'cosmopolitan' is being used here in the sense of an orientation of openness to other cultures, including indigenous cultures, but also to the various 'manufactured' cultures of the modern age such as youth culture, research culture, global culture, and drug culture. This definition also includes enlightenment and excellence of taste acquired by intellectual and aesthetic training. In cultural theory there has been a move away from the ethnographic approach embraced by the first view of culture in favour of the global dimensions of cultural production and consumption embodied in the cosmopolitan view.

I am aware that any definition of culture is necessarily filtered by the cultural 'baggage' of the definer. The truth is that we can never fully apprehend another people's or another period's imagination neatly, as though it were our own. As Geertz (1993: 44) argues, "we can apprehend it [culture] well enough, at least as well as anything else not properly ours; but we do so not by looking behind the interfering glosses that connect us to it but through them ... life is translation and we are all lost in it." (Author's italics). In what follows, I use 'culture' in the cosmopolitan sense whilst recognising that some communities celebrate culture in its ancestral sense. Before leaving this preamble about the meaning of culture, it is of interest to note that there is an older idea of culture which identifies it with tillage and worship. One might imagine, as we see how farming is practised today, that 'agriculture' means 'agriscience' or 'agribusiness' but it actually means 'cultivation of the land'. And cultivation is at the root of the sense of both culture and cult.

### Connecting cultures

My interest in cross-cultural connections arises from running a distance education MA in Environmental Education , an initiative partly in response to the current feverish interest by universities and other educational providers in extending their global reach for cost-effective ways of reaching more students. The personal and professional demands on tutors running these courses are considerable - but that is another story! (Plant, 1998). The demand that such courses be cost-effective can mean that distance educators become addicted to the 'technological fix', their programmes limited to delivery mechanisms, materials production, hardware, student contact procedures and so on. They tend to ignore consideration of the traditional ways by which community groups learn through observation and imitative practice. Driven by computer and telecommunications technology, distance education often becomes constrained by what Giroux (1989) called the "technocratic rationality of education". Some of my concerns have been expressed by Guy (1990: 49-50) who alleges that distance education "precluded serious discussion of the cultural, political and economic nature and outcomes of distance education". I believe that tutors should reconsider the use of computer and communications technologies if it means that important learning outcomes are lost for the sake of assessing easily measured and manipulated content that ignores the diversity of cultural and social identities of the students.

I have a second concern about distance education. Some students may see the course materials as manifestations of the power and autonomy of the tutor, a view which can have important consequences for the tutor-student relationship. Lacking the immediacy of face-to-face tutoring, the course materials can impose values and understanding about issues that are unfamiliar to students in their own cultural contexts. This can foreclose students' readiness to engage in dialogue with the tutor and perpetuate a tutor-centred approach to learning. The course then denies any consideration of students' professional needs and cultural contexts. Instead, what is needed is a student-centred approach that views students as collaborative developers of their own courses. Such materials are called 'open' in the sense that they encourage students to take advantage of the circumstances and events that are of significance to them. For example, I have a student, Sarita Kendall, in Colombia who was faced with a module assessment that invited her to investigate the 'hegemonic hold' of post-industrial society on current social thought and its implications for the formulation of environmental education for local communities. The student protested that the indigenous Indian communities have little experience of what an industrial society is let alone a post-industrial one so what relevance had the question to her? (This, of course, was a failing of the original assessment specification!). After an interesting exchange of e-mails, the student and I agreed on a form of assessment that met the criteria for module assessment whilst allowing her to explore the local impact of the language of globalisation and development on the economic and social sustainability of forest people. Thus, open texts and their associated negotiable assessments encourage students to take advantage of their understanding of local conditions and needs and to develop a critical stance with regard to the interpretation of the course materials (see, for example, Harris, 1987).

I have found that the idea of 'nature' is another example of the difficulties of negotiating courses between cultures. Some students' views of the idea of nature can be markedly different from the dominant Western view which is conditioned to see nature and culture as independent rather than interdependent as, it is often supposed, is the 'view' of indigenous peoples. Culturally specific meanings such as these may be written unwittingly or insensitively into distance education materials on the assumption they are cross-culturally invariant, that the ideas and issues originating in one cultural context are automatically relevant to another. In relation to the 'nature' concept, and other ideas such as sustainability and biodiversity, I am concerned that environmental education programmes encourage understanding and decision-making about environmental issues at the local level. Adams & McShane (1992: xvii) remind me how important it is to be aware of the cultural history of the participating students. In relation to environmental conservation in South Africa, they write:

"The entire modern conservation edifice rests on the ideals and visions of people other than Africans. The great majority of Africans now active in conservation were trained in the traditional Western methods of wildlife management, thus perpetuating a system created in Europe at the turn of the century and inhibiting the growth of an African conservation ethic."

Whilst recognising this history we should also be aware, as Bak (1995:350) writes, that:

"Generations of indigenous Africans have lived in intimate contact with the natural environment [which has been] a direct source of food, fuel and medicine for centuries ... to ignore or denigrate local communities' environmental knowledge and practices is to run the risk of both arrogance and failure".

### Encouraging dialogue

I have identified above how the idea of 'open' texts can help environmental education students gain insight into their own and other people's understanding of the origins of environmental issues. In this way, they are empowered to elaborate and evaluate educational frameworks that are effective in developing their roles as environmental educators in their different professional and cultural contexts. What is important is not simply how the students engage with elements of their culture in order to improve their practice, but how the material and ideological resources of their culture are reflected in the students' action and knowledge; in other words, the students' knowledge is self-developed (Altrichter, 1989: 112). By understanding the methodology, theory and practice of environmental education through critical reflection of their circumstances, environmental educators can begin to understand the social origins of their environmental problems and be fully involved in the social changes needed to improve the human-environment relationship. My experience of running the MA in Environmental Education course has shown me that if students are to be reflective about their professional practice, they need to be part of a learning environment that relates to their sense of personal identity and social context. Thus Benton (1993:183) argues that:

"[An environmental] feature is significant and valued in virtue of patterns of meaning and cultural values which individuals are able to deploy and apply only in virtue of their social belongings. (My italics). The integrity of social cultures and communities are therefore indissolubly bound up with the identification of individuals with their environments".

'Social belongings' means, I think, that environmental educators in contexts and cultures different from my own need encouragement to produce 'home-grown' environmental education programmes, socially rooted and responsive to traditional knowledge and culture and which encourage them to analyse the conventional wisdom of their society, politically, economically, and ecologically in the interests of the environment. When this happens, students are reflecting on their practice and taking appropriate action to change that practice.

### Empowering practice

Empowerment is one of those words used in different contexts by different people for different ends to such an extent its meaning tends to be lost. If we link its meaning to the Foucauldian concept of power that of power being immersed in social relations (Foucault, 1980), then empowerment is a process whereby people become aware of their ability to shift power and authority. But it is also a process of moving from insight to action, so that people are enabled to develop the competencies they need to manage additional power and autonomy (Barner, 1994: 34). The empowerment of an environmental educator's practice can occur at different levels. At one level, he or she may become empowered when they understand how change can come about, for example, by joining up with others to share common concerns. This happens in the MA in Environmental Education course when students meet for group tutorials, or develop a dialogue with their critical friend, or call on me for email, fax and phone tutorials. The sharing of their beliefs with others who have similar concerns about environmental education and the environmental crisis is empowering. At a deeper level, they may have gained sufficient confidence to act in support of change such as involving their colleagues in professional development or redesigning their programmes to emphasise a more critical examination of environmental concerns. Their confidence at this level may be such that they begin to network with environmental and development organisations to enlarge their understanding of issues and their competence to act in a wider national or international context. Let me give some examples.

Helen Perkins (MA student, UK) uses her reading of postmodernity to argue that if Wildlife Trusts are to move away from the idea of institutionalised nature, they need to work together in the same direction and for the same purpose - for example, by listening to the members' views about nature and biodiversity instead of simply the views of the professionals. In this regard she has made connections between the philosophical ideas represented by postmodernism and the need for renewed vision for Wildlife Trusts. For Charles Paxton (MA student, Tokyo), his empowerment is manifested as growing confidence to challenge the hierarchical forms of education that dominate Japanese students' learning. Thus he is "pleased that the [MA] course is taking environmental education into my staff and classroom since this is the first time I have ever conducted professional long-term environmental education in my work place". The heart searching of Tim Cox (MA student, UK) about his professional role empowered him to carry out a piece of research at the Wildlife and Wetlands Trust that showed visitors were willing to make decisions to alter their lifestyles with the aim of achieving a positive benefit for the environment. He concludes: "It has taken the entire MA programme, not only to give me the confidence to explain the importance of my own work but also to recognise my own contribution as an individual to society. The final phase of the MA programme, the research dissertation, enabled me to explore the frameworks of my professional life and to clarify the validity of my present educational role." The reading and engagement with professional issues which Gillian Traverse experienced on the course during the first year of the MA programme encouraged her to write:
"I am aware that, in many areas of life, I live with paradox and conflict: exploring these and accepting them, and inherent consistencies at an intellectual level, has been an important process in helping me to enter into a readiness to explore and challenge ideas and perspectives new to me ...".
Thus for Gillian, empowerment begins with self-awareness that derives from reflective practice. Empowerment makes an important contribution to an environmental educator's capacity to intitiate change in their community.

**Globalising forces**
One of my concerns about international development policies is their failure to listen to the views and interests of local people. Top-down, authoritarian development rarely works, even when it is mediated by NGOs and donor agencies, since it distracts attention away from the many and varied ways in which local people have learned to cope with their environment (Blaikie, 1989; Hoben, 1997) This is of particular interest for me in exploring possibilities for a gender, poverty and development project in collaboration with researchers in Kenyatta University, Nairobi. The project is aimed at relieving the extreme poverty in a rural part of Kenya through an education programme aimed at bringing together traditional knowledge and practices, and the knowledge and experience of the donor agencies. However, this is not a project aimed at enabling people to recover traditional farming systems since poverty and population pressures now prevent them from making an investment in environmental reclamation without outside assistance. MA student Sarita Kendall makes a similar observation about the need for sensitive collaboration between donor agencies and local communities when she writes that local Amazon communities often agree with her that her conservation efforts have something to offer them when it comes to conservation of natural resources.

Development practices raise the question about the privileged status of scientific knowledge which has tended to eclipse the wisdom of less powerful communities whose claims to knowledge is less readily heard. As Blaikie (1996: 82) argues, issues such as biodiversity, deforestation and soil erosion have "provided significant scaffolding for master discourses about the environment involving both policy and practice." Blaikie (1996: 83) sees that these scientific configurations of nature over others have been shaped "to fit the acquisitive strategies of international pharmaceutical/timber/mining companies". Alter-native [sic] constructions of nature, embedded bioregional narratives have at times been either expunged at the end of the barrel of a gun, ... devalued or discredited, or merely buried in silence". ... At other times they have been appropriated as decoration, as fig leaf, as wholesale disguise in the name of indigenous knowledge, participation and co-management ."

Environmental education programmes that celebrate the voices of the marginalised, the poor and the disempowered are important since they open up political spaces in which these groups can have an authentic voice. These programmes need to challenge the notions of progress, and the authoritative voice of science which underpin the unquestioning and unquestioned environment and development paradigms. However, we should guard against the present inclination for reifying indigenous knowledge as the only way of understanding and resolving environment and development problems. It could be simply a trend towards replacing the classic science-led approach that grew out of the colonial model of development by another metanarrative, again emanating from the deliberations of progressive developmentalists in the North. Thus, one of the key questions for me when tutoring students is how to avoid giving, inadvertently, the message that environment and development are problems to be addressed by people in the developing world only; for example, that sustainable development is not the North's problem but primarily the responsibility of the South. MA student Charles Paxton draws attention to the outrageous consumerism of Japanese society to illustrate how market-driven development in a 'modern' culture is predisposed to outstrip the resources on which it depends. This student's critical examination of the link between environmental degradation (the waste produced by a 'throwaway' society) and economic development (the craving for the latest material possessions) illustrates how it is that developed countries need to examine the environmental effects of their longing for economic growth.

MA student Sarita Kendall makes two observations about how the local is being globalised. The first is how the language of development, especially during the last decade, has come to dictate the daily affairs of local Amazonian Indian communities. The second is the need to reconcile economic development with international calls for sustainable development aimed at protecting natural resources in the interests of biodiversity. Biodiversity is not simply an ecological imperative; it is also a commercial one as nature reserves and parks are extended for tourism. Sarita finds that these external pressures cause local Indian communities to make their own demands for control over their lands. Even as traditional ways of conserving natural resources become eroded by development and conservation practices originating outside of their communities, the younger members of indigenous groups are exerting their rights to use local resources without interference. These issues pose a challenge for Sarita's environmental education programmes that aim to reconcile the beliefs and expectations of local communities with the requirements of international groups for sustaining biodiversity in ecological rich regions such as the Amazon.

## Summary

I began this paper by drawing attention to the difficulty of understanding another person's culture from one's own , a problem that Geertz's book, Local Knowledge,explores this with great insight. Since environmental education needs to respond to the social and environmental concerns that matter to a community, understanding how others perceive these concerns is an interesting exercise for those seeking a collective approach to environmental education. However, rather than striving to establish a common curriculum, I believe that educators in both worlds should see environmental education as a collaborative and reflexive search for solutions, where social processes of change become the focus for developing solutions rather than giving information about problems. In this way, that environmental education is conceptualised as developing the capacity for change instead of intervention to bring about change (Janse van Rensburg, 1996). Such a reflexive orientation avoids the necessity for expert tuition and emphasises the importance of 'history' and 'context' when engaging with environmental issues. This can be achieved by an 'encounter' with issues, 'dialogue' about those issues and 'reflection' upon them. I have provided some evidence of how the MA in Environmental Education course is designed and negotiated as a reciprocal teaching-learning, action-reflection process as part of its curriculum. It encourages critical debate and dialogue between the course tutor and students about environment and development issues that are significant in the cultural contexts in which the students live and work. Commenting on the structure and processes of the MA course materials, student Charles Paxton from Tokyo writes:
"It legitimises and redeems environmental education in my teaching context. It has forced an engagement with my contextual realities". For me, an important learning outcome of these student-tutor exchanges is the realisation that learning goals can emerge during the running of an environmental education course.

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# Technology Education: Enhancing the Best of Both Worlds

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*The phenomenal increase in information and knowledge, the accelerated pace of change and the greater variety that is foreseen for the society of the future can be accepted as inevitable (Toffler 1981:360). However, from the perspective of strategic planning D'Amico (1988:237) maintains that:*

> ***... we can influence the future ...***
> ***... today's trends can help us anticipate the future ...***
> ***... today's decisions can help us realize the future scenario that is best for us ...***

## 1 Introduction: A symbiotic relationship between technology (manmade world) and the environment (natural world)?

Is this possible?- a symbiotic relationship between technology and the environment. When one looks at the track record of technology in the past it does not always seem feasible. Technocrats and environmentalists seem to have been at loggerheads for a long time with regard to most of the important issues. Can this impasse be overcome?

Maybe relevant and appropriate education can solve the problem. Maybe we could educate people to influence the future and ensure a future scenario that entails the best for both the manmade world and the natural world. Obviously environmental education would have to play a significant role in this regard but we now have the opportunity to enhance this effort by combining it with appropriate technology education. When technology education is applied in society the results are technologically literate learners. Here we are dealing with educating learners and more is involved than only technological systems, processes and products. The challenge for technology education, and thus for the new **Technology Learning Area** of Curriculum 2005, lies in being able to educate learners at school level to apply technology responsibly in a complex society (Dugger & Yung 1995:4) to which there is far more than only technology and which includes a sensitivity with regard to environmental issues.

> **The aim of this position paper is not to preach to the converted, and at this conference - experts with regard to environmental issues, but to suggest that a close cooperation between environmental education and technology education could perhaps ensure that future generations would insist on a shaping their society in such a way that a symbiotic relationship between technology and the environment is prevalent.**

In the paragraphs that follow the position with regard to technology education and the new Technology Learning Area in South Africa is highlighted. It is largely left to the reader (at this conference obviously experts with regard to environmental education) to recognise the similarities with the aims, principles, procedures and methods of environmental education. In the final paragraphs a few of these similarities are highlighted to emphasise the reason for suggesting that a symbiotic relationship between the manmade and the natural world is possible through appropriate education.

## 2 Rationale for the New Technology Learning Area

Against the backdrop of the outcomes based approach, Technology Education should be presented (teaching and learning) using a problem solving, pluralistic and interdisciplinary approach. The methodologies used to attain knowledge, skill and attitude outcomes should be progressive, integrated and holistic. The outcomes should provide for progression and be differentiated according to varying levels of general orientation, self-critical exercises, design projects and evaluation projects. Continuous assessment strategies should be applied to ascertain whether the outcomes have been achieved on an individual and also on a group or team level (Department of Education 1997b:17-22).

To be able to attain the goals of more relevant education, and of nurturing a culture of learning (including lifelong learning) and technological literacy, the educational authorities have given the following rationale for the introduction of technology as a new learning area.

The **Technology Learning Area** seeks to develop in pupils

- an ability to **solve technological problems** by investigating, designing, developing, evaluating as well as communicating effectively in their own and other languages and by using different modes of communication
- a fundamental understanding of and an ability to **apply technological knowledge, skills and values**, working as individuals and as group members, in a **range of technological contexts**
- a critical **understanding** of the **interrelationship** between technology, society, the economy and the environment

This **understanding of technology** should contribute to

- the development of learner's capability to **perform effectively** in their changing environment and to stimulate them to **contribute towards** its improvement
- the **effective use of technological products**, processes and systems
- the ability to **evaluate technological products**, processes, and systems from a functional, economic, ethical social, and aesthetic point of view
- the **design and development of** appropriate **products**, processes or systems to functional, aesthetic, and other specifications set either by the learner or by others
- the delivery of **quality education** and access and redress through its relevance to the ever-changing modern world and the integration of theory and practice
- the development **innovative, critical, responsible and effective** citizens
- the **demystification of technology**
- the recognition of and respect for **diverse technological solutions and biases**
- creating **positive attitudes to, perceptions of and aspirations** to technology-based careers.

According to Bensen and Bensen (1993:3) technology education could form the basis for what they call **know how** and lay the foundation for the designers and the problem solvers of the future, no matter what particular occupation they may want to qualify themselves in. Obviously the development of critical thinking skills and creativity as early as the foundation phase band would be one of the main objectives in this regard (Mahlke 1993:6). By creating a learning environment that enhances motivation and positive attitudes (Starko 1995:119), technology education could lay the foundation for the development of creativity and a positive problem solving attitude.

To a certain extent technology education can be equated with how the technology learning area will be implemented in schools. The following specific outcomes have been set by the educational authorities for the new technology learning area as part of Curriculum 2005 (Department of Education 1997a:84). Learners will be able to:

❶ ***understand and apply the technological process to solve problems and satisfy needs and wants***
❷ ***apply a range of technological knowledge and skills ethically and responsibly***
❸ ***access, process and use data for technological purposes***
❹ ***select and evaluate products and systems***
❺ ***demonstrate an understanding of how different societies create and adapt technological solutions to problems***
❻ ***demonstrate an understanding of the impact of technology***
❼ ***demonstrate an understanding of how technology might reflect different***

***biases and create responsible and ethical strategies to address them***

## 3 Technology

Many definitions of technology can be found in the literature. The following, however, is the definition used by the education authorities for the purpose of introducing the new technology learning area into schools as part of Curriculum 2005:

> ***Technology is the use of knowledge, skills, and resources to meet human needs and wants, recognise and solve problems by investigating, designing, developing and evaluating products, processes and systems.***

Puk (1996:10,11)(examples transferred) on the other hand gives a definition for particular technologies which may clarify the concept further:

> ***... a technology is a systematic method of achieving a practical purpose. ... Any technology can be classified as being one (or more) of three technology emphases: human processes (surgery, essay writing, algorithms), physical products (computers, corkscrews, running shoes), and environmental ecosystems (canals, gardens, fish ponds).***

## 4 The Technological Process

The technological process describes everything that should happen in a particular technological endeavour - from the inception (an idea) through the development (designing, making, evaluating of a product, process or system) to the conclusion (marketing) of a particular technological endeavour. The technological process is usually described in terms of a set of consecutive steps that are to be followed in a cyclical fashion with feedback loops.

When teaching technology one should try to standardise on one particular approach to ensure that there is continuity through the different grade levels, especially within a particular phase ( eg foundation, intermediate, senior) in the new educational system. For the purposes of this paper the technological process will be considered from a functional point of view and similar steps are grouped together to form a simplified structure.

We can describe the **technological process** as follows:

❶ **Analyse** the problem, need or want
❷ **Design** and develop alternative solutions
❸ **Plan** for the realisation of the optimum solution
❹ **Make** or manufacture a prototype of the optimum solution
❺ **Evaluate** the implementation of the design and prototype
❻ **Present** information for report and/or marketing purposes

In figure 1 this structure of the technological process is depicted in more detail. The reciprocal link between the problem, need or want and the technological process is depicted by the two thick black arrows. The cyclical nature of the technological process is depicted by the arrows linking the different steps. The dashed arrows indicate that continuous assessment during the whole process and during each individual step is recommended. This indicates that the technological process should be repeated as many times as is necessary to ensure that the problem is solved or the need or want is satisfied.

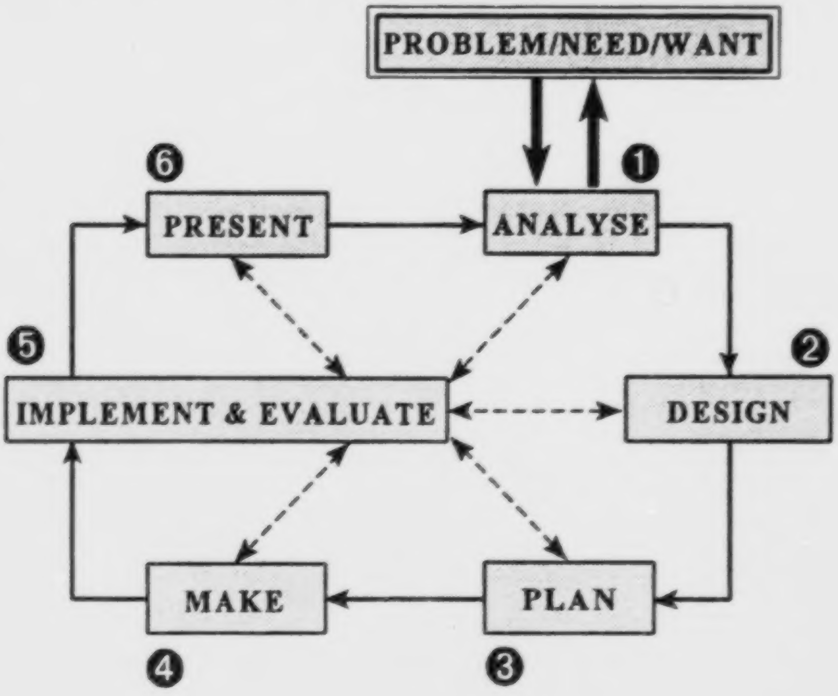

Figure 1 The technological process

## 5 Learning Activities in Technology Education

Technology Education is known for being activity based, using a problem-solving approach and employing continuous assessment with the inclusion of portfolio assignments (Williams 1992:53). It is not as obvious and not usually acknowledged that because of the application of the technological process, there also is a social justification for the Technology Learning Area. This is because learners experience positive social interaction and integration when working together in groups on design teams and have to learn to make decisions together (collaborative decision-making experiences). The learning experiences derived from these activities correlate closely with the basic assumptions of OBE (Van der Horst & McDonald 1997:6).

A wide variety of teaching methods and learning activities can be used for the Technology Learning Area (Adams 1993:103; Department of Education 1997b:43-55; Hansen 1993:21; Johnson 1996:47). For the purposes of this paper only the most appropriate learning activities for the Technology Learning Area are listed.

**Learning activities** directly related to the technological process:

- remember
- research
- plan
- evaluate
- present/communicate
- compile portfolios
- write
- design
- make
- market
- do case studies
- complete projects

**Learning activities** indirectly related to the technological process:

- explore/investigate
- work in groups/teams
- adapt
- mindmap
- structure
- role play
- make models
- demonstrate
- observe
- brainstorm
- identify patterns
- sketch/illustrate
- select
- discuss

Obviously these learning activities should not be seen in isolation. The teacher also needs to plan how the learning activities will be facilitated in the classroom. When planning how to assess the learners the teacher has to base the assessment methods on the function and nature of the learning activities that were used by the learners.

It is important to note that learning activities based on the technological process need to reflect its cyclical nature. A learning activity aimed at developing the ability to generate alternative solutions during the design phase thus needs to be repeated continuously until an optimum solution is discovered or developed (Shackleford 1996:32).

In such cases the assessment should be based not only on the results after the whole process has been completed but also on the results during and after the intermediate repetitions. Where the learners have to try and try again, the assessment of the activities should focus on the learners perseverance and the process (Shield 1992:43) that was followed and not only on the results as such. (Tickle et al 1990:29)

## 6 Continuous Assessment in Technology Education

Continuous assessment implies that data on the attainment of outcomes are continuously collected throughout the learning process and not only at the end of the process or when a particular period of time has elapsed. The purpose of collecting the assessment data should be to determine what the learner can do and what the result of the learning process is (Custer 1996:28).

The main focus of continuous assessment should be the **measurement of practical abilities** (performance indicators), such as being able to:

- demonstrate understanding
- persevere in a process
- produce quality work
- show responsibility
- write a report
- solve a problem
- use tools effectively
- use initiative
- work in a team
- communicate
- apply techniques
- analyse a situation
- design a prototype
- make a presentation

By clustering particular learning activities and abilities together, we can develop the following **types of assignments**, which can be done either **individually** or done by a **group of learners as a team**:

- oral assignments
- research assignments
- planning assignments
- making assignments
- presenting assignments
- portfolio assignments
- written assignments
- case study assignments
- design assignments
- evaluating assignments
- marketing assignments
- project assignments

The criteria which are used to compile indicators of performance with regard to the achievement of outcomes in assignments should also indicate the level of performance that has been achieved. We should, for instance, be able to give feedback to a learner who had to complete a designing activity, on the extent to which different ideas were incorporated into the final design. This could be done using the following statements to comment on the **level of performance**:

- only an attempt was made to incorporate the different ideas

- the different ideas were partially incorporated in the design
- all the ideas were incorporated in the design
- an attempt was made to include additional ideas in the design
- a wide range of additional ideas were incorporated in the design

Obviously there are certain circumstances where it is not possible to make this type of distinction as regards performance indicators. You can, for instance, either recognise and identify a particular type of material or not.

Under these circumstances it is, however, possible to give an indication of the **level of performance** by stating one of the following:

- the learner does not demonstrate an understanding of the issues involved, makes frequent errors, is inaccurate and cannot complete the assignment
- the learner has some understanding of what the issues are, needs assistance to complete the assignment, makes only a few minor errors and needs development
- the learner demonstrates full understanding of the issues involved, needs no assistance to complete the assignment, can communicate effectively and make interpretations in this regard

Because of the many steps involved and the variety of different activities that are inherently associated with the technological process, it lends itself to continuous assessment. The different steps in the technological process differ from one another and a variety of assessment methods can be applied. The activities involved in the technological process are also inherently divided between knowledge, skill and attitude-based or value-based activities. The progression from having to, for instance, first solve simple problems to later solve complex problems means the teacher is able to facilitate assessment at different levels and in a developmental way. These activities and abilities make it possible to use a wide variety of **assessment methods**.

The following types of assessment methods, which correspond to an outcomes based approach and continuous assessment, can be used:

- **self-assessment** - learners are expected to assess their own performance in attaining particular outcomes
- **individual peer assessment** - individual learners are expected to assess the performance of another learner or the performance of a group of learners as a team
- **group peer assessment** - a group of learners are expected to collectively assess the performance of an individual learner or the performance of a group of learners
- **teacher assessment** - the teacher is expected to assess the performance of an individual learner or the performance of a group of learners as a team
- **out sourced assessment** - when other people such as members of the community are involved in a particular project, they could be asked assess the performance of an individual learner or of a group of learners as a team
- **portfolio assessment** - this is an eclectic variety of the work done by learners which can be a deliberate, strategic and specific collection of learner work, or evidence of learner work, that demonstrates that learning has occurred usually with a clear intent and purpose linked to the learning programme outcomes

(Department of Education 1997b:28-36; Department of Education 1997c:25-38; Eggleston 1996:57; Van der Horst & McDonald 1997:167-208)

**It should also be made clear that, when assessing achievement in the Technology Learning Area, the processes that learners followed are as**

**important, if not more important, than the products of the learning process.**

(Shackleford 1996:32; Rogers 1995:73; MacMillan 1995:330)

## 7 CONTEXTUALISING TECHNOLOGY

Technology is such an integral part of the economical, social and cultural makeup of all societies that the role it played in shaping different societies and in bringing about change is often overlooked. There are, for instance, two opposing views in this regard. There are those people who believe that technology can solve all our problems and then there are those that believe that technology is the cause of all our problems. It should be obvious that these views represent the two extremes on a continuum. It must be possible to find a middle ground of some sort to accommodate different views about the ways societies create and adapt technological solutions to particular situations. Obviously not all technological changes have benefited or harmed all societies to the same extent. When teaching technology you should always stress that these differences should be kept in mind when considering the implementation of a particular technology. These aspects correspond to specific outcome number 5 mentioned above and should preferably be integrated with the tasks and activities designed to achieve the first four specific outcomes.

### 7.1 History of Technological Change

Technology has developed in **different ways in different societies** and at **different times in history**. **Technological change** does not always happen in the same way. Sometimes technological development progresses in a linear way in small steps that build on each other. At other times technological development progresses in cycles where previous technologies are revisited and improved on. Technological development sometimes, however, progresses very rapidly and seems to make a jump in a particular direction. To place technology in perspective for learners in the classroom it is advisable to include learning activities about how technology developed and how different societies create and adapt technological solutions to particular problems as an introduction to all design projects. (Almond and Bagshaw 1994:4)

### 7.2 Environment of Particular Learners

To contextualise technology in the classroom you should choose examples, problems, projects, assignments and so on that relate directly to or that originated in the **environment of the particular learners**. Situations at home, in the school, in the community, in nature, in the market place and in businesses are invaluable sources of examples to contextualise technology. This is especially true when the situations are linked with the communication of opinions about general interest topics that are being covered by the mass media at a particular time (Ortega & Ortega 1995:11; Flowers 1994:6). In this way the parents in a particular community can also be involved directly by having learners interviewing them about their opinions or indirectly through informal discussions at home.

The **organisers, themes, presentation styles and resources** that you consider when developing learning programmes are another way of contextualising technology for particular learners in the classroom. Both South African and global themes with regard to housing, food, water, clothing, transport, health, agriculture, energy, sport, recreation and the environment should be used. Present these themes to the learners and then let them discuss and decide which ones they would like to use. Involve the learners in the development of learning programmes by asking them to help you make decisions about how the learning programme will be presented. Their decisions about whether they will be doing the activities individually, in pairs or in groups, and about which resources will be used by which groups, will help them to contextualise the technological activities for themselves.

The way in which you reflect the technological process and different technological products and systems obviously also has an effect on the contextualisation of technology in the classroom. They should be reflected against a realistic, topical and truthful background with regard to, for instance, cultural, economic, environmental, geographical and historical aspects. Within the outcomes based education paradigm it is advisable for the teacher to involve the learners in designing learning activities to enhance the contextualisation of technology.

## 8 TECHNOLOGICAL IMPACTS AND BIASES

We see the impacts and biases associated with technology around us every day. Technology has an impact on most aspects of society and the natural environment. The way we work, live, communicate, travel, look after the natural environment etcetera is influenced to a large extent by the technologies that are prevalent at a particular time within the society we are living in. Unfortunately there are also biases associated with the technologies that we choose to use or are unwillingly confronted with. These aspects correspond to specific outcomes 6 and 7 and should preferably be integrated with the assignments and activities designed to achieve the first four specific outcomes.

### 8.1 Impacts of Technology

The impacts of technology are varied and widespread and differ from one society or community to the next. Learners should be enabled to **appreciate the positive and negative impacts** that technology can have on all aspects of life. This can be done by introducing them to activities designed to review, research and analyse such impacts especially during the first two steps of the technological process.

During these two steps problems, needs and wants are analysed and alternative solutions are designed and developed (partly to achieve specific outcome 1). Specific outcome 4 deals specifically with the selection and evaluation of products and systems. You could, for instance, integrate learning activities aimed at drawing conclusions and making predictions about the positive and/or negative impacts of technology with the activities and assignments that are designed to achieve this outcome.

The learning activities that are designed to achieve the outcomes dealing with the impacts of technology should allow learners to review the technological impact in a variety of contexts. The most obvious contexts would be the impact of technology on society, the natural environment and the economy.

These contexts could then be broadened to include a local perspective and also a national and an international or global perspective. For the learning activities to make provision for the drawing of conclusions and the making of predictions about the intended and unintended impacts of technology they should also allow for short, medium and long-term perspectives.

### 8.2 Biases Related to Technology

In general the biases related to technology that exist in different societies are very diverse in nature. Biases that, for instance, limit access to and the application of technology to certain groups could affect the development and use of technology in that particular society. On the other hand, technology could also be used to promote or counter a particular bias in a particular society.

As mentioned previously, learning activities that sensitise learners to issues regarding the nature and causes of bias should be integrated with the assignments and activities designed to achieve the first four specific outcomes. The learning activities should be aimed at developing an understanding of how technology might reflect different biases in different contexts and societies. Learning activities that address biases with regard to gender, race, age, and disability could, for instance, enhance the learners experiences when introduced during the analysis phase of the technological process. An investigation of the situation within which a particular problem, need or want exists must be done in this phase.

Examples of particular biases could be included as part of the background information on the situation within which a particular technological problem exists. You could then ask the learners to devise different alternatives to address the issue of how gender bias, for instance, could influence the technological solution to the particular problem. Next you could ask them to create responsible and ethical strategies to address the issue of gender bias in the particular technological environment.

## 9 Technology as Part of Our Cultural System

Like language, rituals, commerce and the arts, technology has become an integral part of our cultural system. In general the technological products, processes and systems that are used and applied in a particular society are a reflection of the norms and values prevalent in that society (McCade & Weymer 1996:41). The products, processes and systems generated by technology have been with us since the beginning of human existence. Our early ancestors had particular needs and wants. With the limited knowledge, skills and materials that they had at their disposal, they designed tools, weapons and shelters to enhance their living conditions. This design process was probably very much a *hit and miss* affair.

Today we have the advantage of being able to benefit from what has already been achieved through the technological process and the broadening of scientific and other knowledge. We have access to an enormous range of information, knowledge and skills and a wide variety of different materials. We also have access to a wide variety of tools and facilities for using these resources to their best advantage. These developments enable us to design technological products, processes and systems in a more goal-directed way to satisfy particular needs and wants.

## 10 Technology Enhances Living Conditions

From the discussion above it can be deduced that technology reflects the human made world. It has also become easier to design products, processes and systems that work well, are aesthetically pleasing, are safe to use and are environmentally friendly. It is however very important that, in this innovative and creative process, we do not lose sight of the underlying value of building a healthy and sound society and preserving the natural environment.

> **The impact that technology could have on society and the natural environment should thus always be considered in a responsible way before technology is implemented**
> (Gilberti 1994:10).

Technology should enhance the living conditions of society by providing products, processes and systems which are beneficial from a functional, economic, environmental, ethical, social and aesthetic point of view. Technology Education on the other hand, also empowers every citizen by helping them to live effectively in modern technological society. This applies to all societies, but especially to Third World, poor, underprivileged communities in both metropolitan and rural areas. A better understanding and knowledge of and skills in existing technologies in, for instance, nutrition, water, health, housing, energy, agriculture and the environment could increase the technological literacy of these communities. Technological literacy in these areas of global and South African concern could empower people to develop into innovative, critical, responsible and effective citizens with the capacity to improve their quality of life by using available resources and opportunities. Individuals should be able not only to become involved in the application of technology but to enter into effective dialogue with the professional technologists who make key decisions about their lives and welfare, on a daily basis.

It is, however, important to realise that the implementation of technology in any society will have both beneficial and detrimental effects upon people, wildlife and the environment. Chemical technology, for instance, has made insecticides and artificial fertilisers available to farmers. The benefits of this technology include larger crop yields and cheaper food for the needy. On the other hand the detrimental effects of this technology include the pollution of rivers and underground water sources.
As Liao (1994:4) puts it:

> *We must all become more technologically literate so that we can make more informed decisions about personal choices as well as societal choices. And if our democratic society is to thrive in an increasingly competitive global economy, we must use technology more intelligently.*

## 11 More Relevant Education

The introduction of technology as one of the new learning areas in the educational system could make education more relevant to South African society. This is possible if technology education is aimed at supplying the youth, as future citizens, with the necessary resources to live effectively and meaningfully in a technological world which is becoming increasingly more complex (Savage 1993:41). Combined with the practical nature of technology education, this could also help to establish and maintain a culture of learning among our pupils.

The time frame within which technological changes are now introduced into society has been reduced to far less than the life expectancy of an individual. People are thus exposed to many changes within their lifespan. By incorporating these changes into the learning programmes of the new Technology Learning Area, Technology education has the capacity and potential to establish and nurture a culture of lifelong learning (Draghi 1993:85).

Communication, textiles, transport, tourism, manufacturing, media, sport and recreation could be added to the other global and South African concerns (themes) mentioned above. By including relevant aspects from other learning areas the technology learning area could be integrated to form a relevant whole which will empower pupils to function effectively in a technological environment to the benefit of the individual, society and the natural environment. The technology learning area could thus make a definite contribution towards ensuring that the technological future of the South African society will be a meaningful one (Eisenberg 1994:5).

## 12 Learning Programmes Which Are Fun

In order to realise the specific outcomes of Technology Education in the classroom they need to be developed further into learning programmes. As mentioned above technology education has the potential to make education more relevant. But technology education also has the potential of making education enjoyable because the specific outcomes of the technology learning area can be developed into practical and functional learning programmes which would stimulate a wide variety of interests among learners.

Because the technology learning area is activity based and uses a problem solving approach, one could involve the pupils, their parents and the community by asking them to identify the problems, needs or wants that should be included in the activities of learning programmes. In this way learning programmes in the Technology Learning Area could really become fun projects because they will be directly related to the interests of the learners and would involve the whole community.

## 13 Comparing Environmental and Technology Education

Against the background of the position statement with regard to Technology Education as mentioned above it should now be possible to compare Environmental Education and Technology Education in order to identify common ground which could be used to facilitate the establishment of a symbiotic relationship between the two disciplines.

In table 1 below an attempt is made to identify such common ground. With regard to Environmental Education the principles of Environmental Education as stated at the Tbilisi and subsequent conferences on Environmental Education and various other statements and opinions on Environmental Education were used to identify the main issues that need to be considered when making the above mentioned comparison (Shongwe 1997; Lotz 1997; Department of Education 1997d; Department of Education 1997e; Department of Education 1997f; Department of Education 1997g; Loubser 1996; Dreyer 1996; Schulze 1996; The Scottish Office 1993; Queensland Department of Education 1993; Lob 1989).

The main aim with table 1 is to list issues that are common to both Environmental Education and Technology Education and to identify those issues which are of special interest to enhance the best in both the manmade world and the natural world. This is obviously not a comprehensive list and should only be seen as starting point to facilitate a debate in this regard.

**ISSUES OF SPECIAL INTEREST TO ENHANCE THE BEST IN BOTH THE MANMADE WORLD AND THE NATURAL WORLD**

| ISSUES | Environmental Education | New Technology Learning Area | Issues of special interest to fasilitate both worlds |
|---|---|---|---|
| action based | ● | ● | |
| community centred | ● | | ✔ |
| concentric approach | ● | ● | |
| concept clarity | ● | ● | ✔ |
| cultural interaction | ● | ● | ✔ |
| directed to future | ● | ● | ✔ |
| diversity/variety | ● | ● | ✔ |
| enrvironmentally centred | ● | | |
| experimental orientation | ● | ● | ✔ |
| holistic | ● | ● | ✔ |
| integrated approach | ● | ● | ✔ |
| interdisciplinary | ● | ● | ✔ |
| learner centred | ● | ● | |
| lifelong learning | ● | ● | |
| partnerships | ● | | ✔ |
| problem centred | ● | ● | |
| quality of life | ● | ● | ✔ |
| responsible citisens | ● | ● | ✔ |
| skills oriented | ● | ● | |

**Table 1** **Issues which are of special interest to enhance the best in both the manmade world and the natural world**

## 14 CONCLUSION

The new Technology Learning Area could be seen as a means of empowering students to develop into innovative, critical, responsible and effective citizens with the competences to improve their quality of life by responsibly using available resources and opportunities. Broadly spoken similar competences are envisaged with the implementation of Outcomes Based Education (Curriculum 2005) in general and Environmental Education in particular. Although the environment or Environmental Education, as such, is not categorised as one of the eight new learning areas, the importance of the environment in the new educational dispensation is underscored by the fact that it is identified as one of the organisers to facilitate planning, organisation and assessment within the system. It is, for instance, included as one of the organisers (themes) in the activity and planning charts of all the clustered learning programmes (Literacy, Numeracy, Life Skills) in the Foundation Phase (Department of Education 1997e :xvi; Department of Education 1997f: xvi; Department of Education 1997g: xvi).

In this paper it is argued that by applying the activity based learning methods and continuous assessment approach inherent in the new Technology Learning Area to Environmental Education issues in a cross curricular way, it is possible that both the theory and practice of Environmental Education could be enhanced and promoted. The particular specific outcomes and assessment criteria of the Technology Learning Area that are used in the **environment learning programme organiser** are to be presented using a pluralistic and problem solving approach applying progressive, integrated and holistic methodologies to attain knowledge, skill and attitude outcomes differentiated according to the levels of general orientation, self-critical exercises and the design and evaluation of projects.

Because the Technology Education is inherently activity based and has a problem solving and continuous assessment approach the general finding of this paper is that it is possible that the Technology Learning Area in particular could be used as a means of enhancing and promoting Environmental Education and to attain the goals of more relevant education and the nurturing of a culture of learning (including lifelong learning).

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# The socio-ecological crisis and education for sustainable living: is an essentialist standpoint possible?

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**ABSTRACT**
This paper focuses on the ways in which environmental education can be used to promote Education for Sustainable Living. In doing so it deliberately draws upon an eclectic framework for analysis and suggests a focus on the primacy of action.

The desirability of a community focused, holistic education for sustainable living is suggested and a theory of social change based on an understanding of individuals' actions as pragmatically rational is used to show how individuals environmental responses might be understood.

The paper closes by exploring the tensions between the anti-essentialism of post-modern analyses of social and individual behaviour and an apparently essentialist socio-ecological standpoint.

*This emergence of the settings approach has many significant implications for the conduct of research in the health area. For instance there are many new questions that need to be answered in light of the need for an eclectic approach to theoretical insights which need to be brought to bear on the area. (Colquhoun, 1995, p.134)*

## Introduction

Environmental education is a major component of what the World Conservation Union (IUCN) has described as "education for sustainability". We prefer the term education for sustainable living based on the principles of a sustainable society (IUCN/UNEP/WWF, 1991). A further attraction of the term education for sustainable living is that it is potentially a meta-concept which affords an opportunity to integrate existing cross-curricular issues such as health education, personal and social education, economic and industrial understanding and environmental education. Sustainable lifestyles also imply attention to personal actions and responsibilities as well an understanding of the structural and ideological forces which circumscribe people's current choices and actions. In this way a comprehensive political literacy could develop leading to reflection and action at the local level. This would involve the integration of environmental education and development education with practitioner based education and training for a wide variety of occupations and so would constitute an holistic and viable education for sustainable living. This fusion is not just a content issue, it is an ideological and an epistemological task leading to, in Naess' (1984) terms, a locally derived ecosophy which recognises that for most of the world's population, both ethically and spatially, the local is their most important global action field. Education for sustainable living is fundamentally about the links between the health of the human species and its supporting social systems and the health of the planet which we inhabit.

There is a clear commitment in education for sustainable living to changing attitudes and practices so that actions are more consistent with sustainability in whatever sense this term may be locally constructed. It is through the primacy of actions that the ultimate evaluation of the success of any educational programme for sustainability will be made.

Most approaches to environmental education recognise the need for action at the local level and there have been some examples of success (Scarce, 1990; Greenall-Gough and Rowbottom, 1993). However the examples of successful action flowing from formal education appear to be limited although there are some (Vognsen, 1995, OECD/ENSI, 1994). As Vognsen recognises local action is not simply a matter of

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geographical convenience it is also a microcosm of the global and the most important global action field for most of the world's citizens. Local action is therefore not at the expense of identifying global links and assessing global impacts. Paradoxically, evidence is beginning to emerge in Western Europe (Froud, 1995; Corrado and Nove/MORI, 1995) that people feel that they can do little locally to influence many of those environmental issues which they consider to be serious.

Forging effective links between the local and the global and perceiving the essence of the local as a microcosm of the global clearly require holistic cognitive models rather than the fragmented structures which dominate Western modernist epistemologies. While recognising that all models are in some way reductionist narratives, the Gaia theory (Lovelock, 197911995 and 1988/1995) and deep ecology (Naess, 1984) both emphasise holism rather than the narrow reductionism of many models of human ecology. Environmental education, whilst espousing holism at a cognitive and cerebral level, has generally failed to use the same concept as an organising principle. What we are advocating is that holism, in the sense that we will develop it in this paper, becomes the basis for organising educational provision at the level of practice. Greig et al. suggest that *(h)olistic education does not necessarily depend upon a rearrangement of the curriculum, a shift to inter-disciplinary timetable slots, although that might well help; it calls, rather, for an attitude of mind on the part of teacher and student alike which prioritises and searches out relatedness to the whole* (1989, p. 22).

Holism, as Naess and Lovelock both recognise, requires much more than the rationalist integration of modernist cognitive structures, though this would help. As Grieg et al. (1989) point out, holistic education requires a change in attitude, which is partly an emotional process. Goleman (1996) takes this argument a step further by asserting that emotional intelligence is essential for effective decision making and that we need a new paradigm which recognises the integration of the rational and the emotional. Such an integration of the emotional and the rational in educational practice would therefore appear essential if effective local and global decision making, the prerequisites of sustainable living, are going to develop. As Goleman points out feelings are typically indispensable for rational decisions, they point us in the proper direction where dry logic can be of best use. The five main domains of emotional intelligence are: knowing one's emotions, managing emotions, motivating oneself, recognising emotions in others and handling relationships (Goleman, 1996). These are relevant to the social dimension of education for sustainable living. These five domains also complement the affective dimension of human relationships with nature which characterise much of the writing of those in the deep ecology movement (Naess, 1984). Goleman suggests that "(t)he old paradigm held an ideal of reason freed of the pull of emotion. The new paradigm urges us to harmonise head and heart. To do that in our lives means we must first understand more exactly what it means to use emotion intelligently" (1996, p.29).

Holism also has a practical connotation as Chodorkoff (1990) indicates. In the context of this paper we contend that holism implies a lateral and vertical, community based and lifelong integration of education and training provision. This is likely to involve a coherently sequenced and locally focused action based programme which will have been developed from priorities assessed by local neighbourhood groups. Chodorkoff notes that *(t)rue community development, from the perspective of social ecology, must be a holistic process which integrates all facets of a community's life. Social, political, economic, artistic, ethical and spiritual dimensions must all be seen as part of a whole. They must be made to work together and to reinforce one another. For this reason, the development process must proceed from a self-conscious understanding of their relationships (1990, p. 71).*

Such an approach can also be criticised as being reductionist. However, we see this community focused practice in terms of Naess's (1984) concept of *ecosophy* where decisions leading to action count for more than generalities. Furthermore, holism should not be associated merely with a cross-curricular approach which is at best a multidisciplinary operational form. Rather, holistic education can be construed as thematic, transdisciplinary or interdisciplinary with a coherent cognitive focus supported by strategies to develop emotional intelligence which will lead to sustainable action at individual, institutional and community levels. Action should be based on the priorities which emerge from comprehensive physical, institutional and curriculum auditing conducted by local people. Actions flowing from this localised community based concept of political literacy have a much greater chance of success.

In practice an holistic approach means adopting a definition of environment consistent with the concept of education for sustainable living. By this we mean an education which tries to engender attitudes and practices based on the following beliefs or principles:

a) *that people as groups, within communities, given effective voice, are able to manage that the world, as an ecosystem, should continue forever;*
b) *their own resources;*
c) ***that we should aim to improve the quality of all life whilst living within the carrying capacity of the supporting ecosystems;***
d) *and that the actions based on these principles should be undertaken on the basis of what is known at the time* (IUCN/UNEP/WWF, 1991).

Some of these principles are implicit in the QUARK-programme in Denmark (Vognsen, 1995). But while this programme has addressed the need for community involvement required by the Danish Education Act it has neglected the imperative for a coherent synthesis of sequenced, lifelong and community approaches. This synthesis requires the co-operation and collaboration of all the stakeholders and agencies with an interest in the area, particularly those contributing to the educational process. Agencies need to be established by negotiation so that they can act as forums for the development of locally co-ordinated approaches to education for sustainable living. Such co-ordination will help to ensure that programmes of education for sustainable living result in and maintain actions which address locally assessed priorities coherently.

Thus far formal education systems (wittingly or otherwise) have failed to come up with workable solutions to environmental problems because they have failed to grasp what environmental education should be about in that they have failed to recognise the central importance of appropriate levels of action at the level of communities and personal responsibility. Consequently, it might be argued that in terms of developing models of education for sustainable living, concentrating on the formal education sector alone will neither reveal answers nor provide the education which would instil the values that underpin the changes in behaviour necessary to achieve sustainable living.

In the opinion of many, the worsening environmental crisis of the last twenty years is a clear sign that formal environmental education has failed not least because it has failed to prioritise local solutions. Radical policies, such as specialist environmental education departments in educational institutions or more informal educational approaches working with and through Non Governmental Organisations (NG0s) have been suggested by some (van Matre, 1990).Others (Shallcross, 1993, Sterling, 1994 and Plant, 1994) have suggested that the neglect of crucial epistemological, structural and organisational elements have led to a lack of coherence and, consequently, effectiveness in environmental education.

In this paper we want to address some of these issues by examining the concept of community education for sustainable living because it would appear that it is through the community, as the locus of both individuals' identity and their actions, that the sorts of changes in peoples thinking and action as concerned citizens will be effected. From this examination we would wish to draw out a model of education for sustainable living and the implications for educational action and pedagogy and then begin to explore the possibilities and constraints for fusion of two competing models of environmental educational ideologies.

## Community Education for Sustainable Living

The concept of sustainability raises the question of who or what is to be sustained? This question is best answered at the local community level, but there is no point in asking the question if communities are not being empowered to generate and apply their own solutions through the process of conscientisation (Freire, 1972). We feel that Freire's contributions to debates about pedagogy are so pertinent here because of the links which he establishes between oppression, conscientisation and dialogue. Furthermore, as we argue later, the fact that his theoretical perspective was developed through his experiences working with peasants in Brazil, Chile and Guinea-Bissau makes his analysis more appropriate in relation to models of education for sustainability which are focused on community empowerment.

The problem with the term 'community' is that it is a largely elusive concept because it is, primarily, an evaluative concept and only secondarily a descriptive one (Martin, 1992). Consequently it is the embodiment of a plurality of interests, needs and aspirations. Thus the concept of education for the community is essentially political since it is a process in which the collective dimensions of people's experiences and expectations are articulated and reconciled educationally. As such it hinges upon 'active citizenship' (Allen, 1992) which entails individuals leading autonomous lives of their own choosing as morally responsible individuals. This moral responsibility is learnt through attempting to achieve considered, reflective choices on the type of life to live. Such reflection is predicated upon informed decision making. This informed position requires knowledge not only of what the individual is going to do but also what consequences are likely to follow from the action(s) (Crick and Lister, 1974). It is what White (1983) describes as 'education in power' or, as Crick (1975) suggests, it is founded on the procedural values of freedom, toleration, fairness, respect for truth and respect for reasoning. 'Community', then, becomes obligation. Mead, (1986), describes the nature of this obligation towards oneself and one's fellow citizens as being the distinguishing feature between acting as "full citizens" and not doing so. Citizenship, that is community membership, is, then, the embodiment of individual responsibility, self-respect and achievement orientation (Morris, 1994) which allows, as Fullinwider (1988) notes, the achievement of instrumental goals like social peace and human capital investment and non-instrumental goals like solidarity and social justice.

Education in the community means that crude distinctions between educational institutions and the community must be avoided. Formal education tends to have physical links into the social systems which are seen as making up communities (Bell and Newby, 1971) rather than ideological links. Understanding education in the community involves understanding the ways in which stakeholders make sense of their own roles by appealing to what are often idiosyncratic paradigms and processes. In this way their 'locus of identity' (Wallman, 1984) is crucial to their roles. The ways in which individuals and groups engage with the social systems which make up communities are well researched (Smith, 1988) and although the formal educators expertise is recognised as being located within the process of enabling learning (Jeffs and Smith, 1990) what is currently neglected is the way in which formal and informal education in the community will impact on the delicate social ecology of communities, individuals and educational institutions which interact with and are part of them.

As Brundtland (1992), among others, argues the large ecological issues such as the greenhouse effect, the disappearing ozone layer and the sustainable utilisation of tropical forests are tasks facing humankind as a whole. Education about the environment is an unsatisfactory means of dealing with these issues (particularly in isolation, Robinson and Garratt, 1994) because the largely cerebral and cognitive focus of educating about the environment in most formal educational settings has resulted in the neglect of the affective domain and of action based on personal responsibility which is a clear feature of the deep ecology approach. Even when environmental education is *in* the environment it is largely driven by instrumental goals seeking to develop a deeper understanding about the environment; rarely is education in the environment concerned with interventionist approaches designed to affect environmental improvements (Masterson, Shallcross and Simpson, 1995) reflecting the interdependence between Environmental Education and Education for Economic and Industrial Understanding (Robinson and Garratt, 1994). An education for sustainability predicated upon the principles of the community as outlined above which is not only about but through, in and *for* the environment and which leads to *action* can contribute to the achievement of Fullinwider's goals.

Approaches based on locally focused (rural) priority assessment is much more in evidence in many parts of the Less Developed World than in Britain and is a model which could inform practice in Britain. It is also an approach which stresses the importance of indigenous or traditional knowledge in concert with intermediate technology as one of the cornerstones of sustainability (Ecolink, Natal Parks Board, 1994), which is why Freire's (1972) analysis is important here. However, it is clear that despite the greater emphasis in Africa on local community action the activities of NGOs, formal educational institutions and informal educational processes are no better coordinated there than in Britain. In fact the legacy of apartheid has been some mistrust and antagonism between these agencies. There is great interest in South Africa in approaches developed by the Scottish Consortium of Teacher Training Institutions to training environmental educators to prioritise action at the local and institutional level (see also McCulloch et al., 1992).

Environmental Education is generally felt to be a higher priority in the less developed world than in the advanced, industrialised nations (UNESCO Seminar on Education for Sustainability, Academic Conference of the Global Forum, Manchester, 1994, Commonwealth Environmental Education Priorities Conference, Bradford, 1993). There is also a tendency in many countries in the Less Developed World to reject Western, academic models because they are perceived as inappropriate, paternalistic forms of neocolonialist intellectual domination (Bak, 1995). This trend is particularly strong in South Africa, particularly among English speaking academics, activists and members of NG0s. These groups all recognise the pragmatic imperative to address basic human needs and the fundamental importance of the process of redressing poverty as the first issue to be tackled by any programme which seeks to develop awareness of environmental issues at the global level. Similarly in Sweden examples of locally focused action based on assessment of needs by and for the local community can be found (Robinson and Garratt, forthcoming). The same pragmatism could, perhaps should, be applied to urban and rural areas in Britain with high levels of deprivation where many residents perceive a similar paternalistic attitude in bureaucracies.

## Developing a Model of Social Change

In trying to understand how sustainable environmental understanding can be achieved a general emphasis on social action is clearly important. We cannot forget the consciousness and motivation of individuals. Nor can we rigidly assume that actions are always preceded by motives and that such motives are caused by forces outside the individual in any direct way. Such assumptions are clearly overly simplistic. Social groups, communities and possibly societies as a whole are constantly reproduced, modified and transformed by the actions of individuals who make up those social groups, communities and societies. The influence which individuals' actions have on such social groupings, then, exposes the fragility of the social world and its susceptibility to change. However, because individual action is often not *thought full* action, in any conscious sense, change is constant and often unintentional and, in the realm of actions for sustainable environments, all too often serendipitous.

Attempts to describe, explain and understand the complicated nature of individual social action and its relationship to wider social change through an examination of power, conflict and constraint are often unconvincing. For example Weber's theories of social change (1978) which focus on cultural 'development' and actor's motivations, whilst instructive, were developed largely outside any context of particular social structures and their dynamics. Symbolic Interactionists, like Mead (1934), whilst providing rich qualitative research data, have largely failed to generate a theory of social change. Within such approaches the individual is seen as an actor and action gives interaction a dynamic twist. Societal responses result from the deliberation and discussion which takes place among and between the members who then select an appropriate course of action. Strauss (1962) comes closest to showing how this might work with his metaphors of 'life trajectories' which focus on 'transition points'. Others like Giddens (1985) and Bourdieu (1977) have explored the interface between structure and agency. Giddens (1985) unifies the notions of social structure and social action by giving causal status to both in the production and reproduction of social reality. For Bourdieu (1977) individual action is culturally and socially situated, in other words we are disposed to see the world in a particular way. Thus individuals make choices which are both conscious (ie thought full) and unwitting (ie unthoughtfull) and which are transformative in an individual and a social group sense, and the social group can be seen to be operative at a variety of levels from small to intermediate (community) to large (society). Therefore, in terms of sustainability, which obviously requires a significant change in human behaviour, there is a need for agencies and networks working at the appropriate scale which reflect the principles outlined above, such as local priority assessment. One rewarding area of analysis for explaining individual actions is the concept of 'commitments'. Becker (1960) notes that commitment is the process through which several kinds of interests become bound up with carrying out certain lines of behaviour to which they seem formally extraneous. What happens is that an individual, as a consequence of actions she or he has taken in the past or in the operation of various institutional routines, finds that she or he must adhere to certain lines of behaviour, because many other activities other than the one immediately under scrutiny will be adversely affected if she or he does not. Consequently, individuals cannot indulge in certain actions. Becker uses the example of a "conventional person" not indulging her or his interest in narcotics (1960, p.27) because her or his reputation in the neighbourhood depends upon continuing to avoid temptation. Hughes (1958) identifies how "career contingency", which refers to the sequence of movements from one position (within an occupation) to another, can be used to explain social behaviour. Both Becker and Hughes identify how behaviour of an individual is a consequence of both objective facts of the social structure and changes in the perspectives, motivations and desires of individuals. Therefore, sustainable behaviour will not materialise effectively unless it is supported by community based social structures. Schools *may* be catalysts of change but they cannot catalyse without the reinforcement from a wider social base.

Other writers, like Ellul (1964), argue that human beings are inclined to search for the "one best way" of doing anything and everything. This search for the "technique" (the best way) is, Ellul argues, inherently opposed to freedom. As a consequence human behaviour becomes systematised and essentially dehumanised. For Habermas (1970) this is a form of technical or instrumental rationality. Human rationality is considered to be central in reasoning, problem solving and decision making (Baron, 1985). Simon (1956, 1957) argued that the way to explain the association between human thinking and human behaviour in complex social settings was to understand the relationship between goals and the conditions and constraints imposed by those settings. This Simon (1982) referred to as 'bounded rationality'. Such rationally driven human behaviour has been rejected by Hodkinson and Sparkes (1993), who favour the concept of "pragmatic rationality". All these attempts to explain or rationalise social behaviour suggest an inherent complexity in perspectives, motivations and desires. A key problem here is the duality (at least) of levels on which social action takes place. Social action occurs at a minimum of two levels simultaneously. It occurs at the level of large institutions which shape the nature of the social, political, economic and cultural landscapes within which individuals develop their identities and it also takes place at the grass roots level, the level of action which we, as individuals, understand most readily. The upshot of this is that we, as individuals, have the free will to make choices but largely not in circumstances of our own making. In another context Cicourel (1968) has shown how our perspectives, motivations and desires are the consequences of "background expectancies" and common-sense constructions which individuals cannot readily articulate. To argue, therefore, that in anything other than a very generalised sense they explain individual behaviour is difficult to sustain. If analyses of the roots of individual behaviours are so complex, a fact exacerbated by individuals abilities to both be incapable of articulating to researchers the rationality of their actions and at the same time to be able to construct *post hoc* justifications for them which are partly bound up in a reinterpretation of their own histories, then identifying the alternative measures and viable programmes to bring about appropriate changes of behaviour in relation to a sustainable environmental future is even more complex. And yet that is precisely what environmental education is (or should be) seeking to do.

However, some suggested solutions to this dilemma may be at hand. From the context of trying to understand how young people make career choices Hodkinson (1995) has identified how it might be possible to explore the complex interrelationship which Becker (1960) and Hughes (1958) have identified between individuals actions, their location within the social structure and their perspectives, motivations and desires. Sociologists have long argued that individuals who share a similar relationship to the social structure tend to share similar perspectives, motivations and desires because of the common elements in their shared processes of socialisation. These "intersubjective agreements" (Berger and Luckmann, 1967) mean that, as Bourdieu (1977) suggests, individuals do have similar dispositions to see the social ( and natural) worlds in particular ways. Hodkinson has argued, from a detailed analysis of the various perceptions of stakeholders involved in young peoples career choices, that choices which are made are rational to the chooser even if they do not appear to be rational to the interested professionals such as careers officers. This distinction which he draws between technical and pragmatic rationality appears to us to be a fruitful area for exploration in trying to come to terms with the ways in which young people (and others!) develop their understandings of, their stances towards and their actions within the environment and reinforces the need for much decision making about environmental policy and educational processes to reside at the level of affected and effective communities. Furthermore it might be one way to explain or understand the discrepancies uncovered by Froud (1994) between the attitudes and expected behaviours of the young people in her sample.

Environmental education which seeks to promote an understanding of sustainability, then, must take into account the nature of social action. However, explanations of social action demonstrate how multifaceted and multilayered it is. Necessarily, this gives rise to a model of environmental education which can accommodate such complexities and incorporate such social action into its practice. Environmental education, in its broadest sense, needs to be integrated and coherent. Children are instinctively sensitive to hypocrisy and are adept critics of gaps between policy and practice (Titman, 1994). Arguably the only form of environmental education consistent with the concept of sustainability is one founded at the level of community on whole institution approaches in which the formal, operational and hidden curriculums are in concert with each other and emphasise in their practice the importance of action and affection as well as cognition and (pragmatic) rationality. An additional problem, however, lies in the fact that we cannot distinguish the difference between 'not knowing' and 'not recognising' and both forms of blindness require different remedies. A consistency of provision across all agencies with either an implicit or explicit environmental education agenda will impart lateral coherence to actions and imbue education for sustainability with the beginnings of a systematic lifelong approach to sequencing. Both dimensions are, however, usually absent from current provision.

What is required, therefore, is an holistic, integrated strategy for education for sustainable living which promotes an awareness of issues concerned with global environmental change through local action and participation. Such a proposal is in keeping with the recommendations made by the British Government Panel on Sustainable Development (1995) (see also Stuart, 1994, Smyth, 1995 and Fien, 1995). In order to do this instruments for conducting environmental audits as the basis of locally assessed priorities will have to be developed so that the effectiveness of the multi-layered, comparative analytical model which combines research methodologies in an innovative way can be tested. In order that the model is fully integrative it will be necessary to compare and evaluate and learn from innovative, practice-based training of students and practitioners in a variety of contexts. In such a way data to inform the policy and practice of education for sustainability will be provided. The outcome will involve an eclectic and interdisciplinary model which emphasises vertical integration and is cognisant of the centrality of affective learning. The vertical integration should involve primary, secondary, further, higher and community levels of formal and informal education. The objective of this developmental process is to examine the nature of an education for sustainability which synthesises practice and theory in a community based approach to environmental education which may result in a shift to post-modem curriculum paradigms (Doll, 1989; Gough, 1989; Orr, 1992 and 1993) which are placing strains on educational systems as students expectations change as a consequence of a quest for an empowerment of their own lives, alongside changing access routes to knowledge and experience, the shift from segregative to integrative structures and demands for greater public accountability which are all impacting on curricula in some way. Education for sustainable living has to address ecological issues such as pollution and resource depletion. The fusion of the ecological and social strands implies new lifestyles which incorporate the sustainability of pre-industrial societies with the improvements in life chances the quality of life associated with some new technologies so long as these do not jeopardise ecological homeostasis. Furthermore, it is entirely in keeping with the concept of 'acting as a full citizen' referred to above. One starting point might be physical audits of environmental quality based on rural priority assessment approaches (Chambers, 1994) which would not only generate local involvement but would also provide a baseline from which subsequent environmental improvements could be measured. A key issue here is trying to identify what changes take place as a consequence of stripping away the blindness of not knowing or not recognising and identifying the mechanisms which would promote an awareness of the realisation that individuals are central characters in the play which is their own lives.

The foregoing analysis has significant implications for educational action and pedagogy. Coalescing the principles referred to above into an holistic model is based on the principle that sustainability suggests that programmes of education for sustainable living should seek to facilitate local actions which involve all the stakeholders in a local community at every stage from planning to implementation. A lifelong commitment to sustainable actions also requires that greater attention be given to the pragmatic and ideological neglect of the affective education necessary to give such actions motivational sustenance. Actions should lead to improvements in the quality of life which do not threaten local or global ecosystems in the medium or long term. It is predicated on the assumption that real progress in these directions must be problematic without a basic understanding of the concept of ecosystem. Yet research suggests that this is a poorly understood concept (Lenton and McNeil, 1993).

In our view what this foregoing analysis reveals is that research in the area is misguided because it is conducted from the wrong standpoint. We would now like to develop an argument which calls for the establishment of a new standpoint from which research in the area might be conducted - a standpoint of social and environmental justice.
"The recovery of the (socio-)ecological imperative" (Bowers, 1993) - the missing standpoint Denzin (1997) advocates his concerns for ethnography in the 21st Century from a perspective within the globalisation of culture although he seems, to us, to fail to acknowledge the globe itself. This is within a context which is widely recognised to involve the world's population facing a global environmental crisis, or as Athanasiou ( 1996) suggests, a global 'socio-ecological crisis'. (There are, however, detractors from this position. Easterbrook (1995), for example, labels environmentalists as 'doomsayers' and he argues that only 'bad' environmental news gets a hearing and that we ignore the 'fact' that planetary environmental health is improving. This position which Easterbrook adopts is however a very North American focus with strong overtones of a culturally biased viewpoint creeping through his analysis. "Yet today the New York area shows guarded measures of ecological improvement ... while in Bangladesh numerous measures of

ecological health are veering toward the critical" (Easterbrook, 1995, p. 15).) Furthermore, it is becoming clear that whilst the environment has become the most significant issue in the range of concerns for young people (Corrado and Nove/MORI, 1995; Froud, 1995; McNeish, 1996, p. 96), and despite a general level of agreement at the level of governments across the globe (for example the Tbilisi Agreement, UNESCO/UNEP, 1978) that the environmental crisis has to be contained and reversed, and despite more than twenty years of environmental education in the West, there is singularly little evidence (not withstanding Easterbrook's (1995) comments) that formal education systems have made a significant contribution to the lessening of the global environmental problems.

Several reasons can be suggested for this apparent failure. van Matre (1990) argues that part of the problem can be attributed to the fact that the mission of environmental education has gone astray. He argues that environmental education has become to be defined so broadly that almost anything would count as positive, that lifestyles have been ignored, and that although mounds of conference papers have been delivered (but not really listened to) no clear model has been generated which all can aspire to. Other reasons put forward for the failure of environmental education include the focus on education about and through the environment with rare attention paid to education in and for the environment. This approach is based on the fallacious assumption that if people are aware of environmental problems they will do something to resolve these problems (SEEPS, 1997). This concentration on the cerebral or cognitive domain has distracted teachers from paying attention to the importance of the affective domain and the creation of an education for the environment which is an essential component of the creation of positive attitudes towards the environment (Goleman, 1996). We have gone further to suggest that although a recognition of the importance of the cognitive and affective domains working together will be an improvement, what is required is an acknowledgement of what we have called the 'effective domain' which concentrates on action rather than value and which links ontological and epistemological understanding (Robinson and Garratt, forthcoming). And despite the culturally relativistic call to 'all to aspire' it could be argued that without both a local, community focused and national governmental focused initiatives, in concert with initiatives across the globe, the global socio-ecological crisis will continue.

An essential component within any claim towards a standpoint must include the affective as well as the cognitive response to that which is being 'stood for'. The ontological and epistemological dimensions of understanding and seeing are interrelated within a standpoint. We want to use Lang's definition of affective education to underscore our point. Lang (1996) defines affective education as follows:

*(b)y 'Affective Education' is meant that part of the educational process that concerns itself 'with attitudes, feelings, beliefs and emotions of students. This involves a concern for the personal and social development of pupils and their self-esteem ... A further important dimension goes beyond the individual student and concerns the effectiveness of their relationships with others, thus interpersonal relationships and social skills are recognised as central to 'Affective Education'* (Lang, 1996, p. 2).[To this we would also add the need to consider action.]

Having established what we mean by affective education we want to digress in our argument to establish another concept which is crucial to our claim to link ecological and social justice. This digression involves recognising that the current debate in environmental education has shifted towards an education for sustainable living (Fien, 1993 and 1995; Gayford, 1996; Huckle, 1993 and 1996). This debate involves identifying the principles of sustainable living. Fien's Principles of Sustainable Living are as follows:

1 every human being is part of a community which is made from all living things. The community ties human society, past, present and future, with the rest of nature.
2 all humans have equal and basic rights. These include the right to life, liberty and security of person, freedom of thought and speech, freedom of religious choice, participation in government, education and within the limits of the Earth, the right to necessary resources for a healthy standard of living. No individual, community or nation has the right to prevent another from access to their means of living.
3 every person and society is responsible for the protection of these rights of all others.
4 all life forms have the right to respect independently of its value to people. Development should not threaten the survival of other species. Humans should avoid unnecessary killing and cruelty to other species.
5 each person is responsible for his/her own impact upon nature. People should conserve ecological processes and diversity of nature, and endeavour to use any resource efficiently and sustainable.
6 each generation should ensure that the world left for future generations is at least as diverse and productive as the one inherited.

7 responsibility for these actions is both individual and collective and transcends all cultural, political and economic boundaries. (adapted from Fien, 1993)

If we accept Lang's definition of affective education, within the context of environmental education, and we refocus what might be meant by "effectiveness of relationships with others" and "social skills" some way forward may be found. The context of the refocusing we propose lies within the principles of sustainable living suggested by Fien (1993) above. Fien suggests, among other principles, that all life forms have the right to life independently of their value to people. We want to use this principle as the context for talking about relationships and social skills within the context of affective education within environmental education and for making the claim to connect ecological and social justice. That is we want to suggest that in understanding what "others" might mean we need to take on board the diversity of species and not just read others to mean other human beings. In this context, then, our "social skills" are extended to involve our skills in dealing with the environment. The final stage in our argument draws upon two influential American educational thinkers Gregory Bateson (1972 and 1980) and C. A. Bowers (1987 and 1993).

Bowers argues that there is a significant silence in educational philosophy which has failed "to address the paramount issues of the day" namely "the ecological crisis" (1993, p. 147). Part of the problem, according to Bowers, has been a critique of the problems of modernistic analyses of educational issues which have been largely of a formulaic quality (1993, p.99), reinforced by an over-reliance on technocentric solutions to educational problems (1993, p. 103 ff.) (see also Benne, 1990, pp. 76-87). Bowers suggests that one way to overcome this failure of educational philosophy is to locate the primacy of the constitutive role of culture, and especially language, in shaping consciousness, and therefore the texts of peoples' lives, "within the information and energy networks essential for survival - namely, the environment" (1993, p. 99). Bateson (1972 and 1980) argues for a bringing together of educational philosophy and practice. He argues that we should give up the old view of the individual as an autonomous observer who may be moved by internal events such as thoughts, feelings, sense of self-interest, to act in a particular way upon the external world, and focus, instead, on the individual as part of a larger, interactive system. Bateson's argument is that the reification of the individual (in the West) as an autonomous entity has helped to foster the myth that the survival of individuals can be separated from the fate of the larger system in which individuals are participants. For Bateson the primary unit of survival is the system as a whole. Although we would question the validity of this claim (see Robinson and Shallcross, 1996 and Shallcross and Robinson, 1997), for now we want to accept the spirit of Bateson's argument as a building block within our own argument (for what we would question is the scale of 'the system as a whole' rather than the concept itself). For Bateson the 'unit of the mind' which makes up and interconnects individuals within the system as a whole includes the air, water, rocks, plants, humans and other animals and everything else that may be part of the living ecosystems which make up the planet. For Bateson the system is an 'ecology of mind'.

To link the above debate to our argument, therefore, requires us to claim that what Bateson and Bowers are arguing for is similar to that which Fien is arguing for. In fusing the cognitive and affective dimensions of our standpoint requires us to accept the participative, integrative us rather than the autonomous, self-interested us. The me that each of us must accept is inescapably linked to the interactive ecological system within which we find ourselves. In order to be a socially just human being in our relationships with other human beings, we must also take responsibility for our own place in the environment. Social and environmental justice go hand in hand. Social justice is environmental justice. The search for our social justice voice needs to accommodate our environmentalist voice. As Bowers suggests:

> *What is now needed in teacher education is a shift from the Cartesian position of an autonomous, culture-free individual to a ... (f)ramework that starts from the premise that we must expand our understanding of mind outwards to the point where we can recognize self as part of the information-exchange processes that constitute the ecology of which we are a part. Our ability to participate fully in the information exchanges that characterize this ecology of pattern and relationship is dependent ... on the metaphorical framework we use (and that uses us) in the interactive process we call "thinking". Shifting from the root metaphor of a human-centred universe to that of an "ecology" seems fundamental to getting right the complex relationships between the culture/language/thought connection and the habitat, and to helping teachers recognize that we must begin to make a shift from the modern and the transitory to values and beliefs that contribute to cultural patterns* based on long-term sustainability and interdependence within a larger sense of community (Bowers, 1993, p. 146).

Although there are many ghosts here in that Bowers is rejecting one modernist narrative ("the Cartesian position of an autonomous culture free individual") for another ("long-term sustainability and interdependence within a larger sense of community") this invocation from Bowers encapsulates our standpoint and its links to education for sustainability. Furthermore it sets up a possible context within which the textuality of our (partial) lives can be read. If, as Denzin asks "(i)s it possible to effect change in the world, if society is only and always a text?" (1997, p. 4), then the answer is an emphatic maybe when that text is the socio-ecological imperative itself.

Schools and universities are vital elements in the reproduction of ethnocentrism, the antithesis of social justice. But it may also be possible that they could become equally powerful agents in the process of combating and reversing ethnocentrism. To do so the traditionalist modes of knowledge and its transmission which predominate at the moment will need to be manipulated. Privileging certain forms of knowledge or ways of understanding over others, such as western science or patriarchal research methodologies, will serve only to reinforce division. Post-modern critiques of the curriculum and teaching and learning, which are predicated upon a pluralistic, contested, manifold, provisional form of knowledge, offer a positive alternative. As Orr (1992 and 1993) suggests, post-modern critiques of education recognise the tangible difficulties which confront pupils and students as they approach adulthood and their teachers. One of the most significant difficulties which faces people is the global socio-ecological crisis as represented by the depletion of finite resources, demographic expansion differentially and unevenly distributed, pollution, global warming, the viability of life-forms and pharmaceutical exhaustion. The post-modern challenge is sustainability. The social and the ecological are inextricably bound up in one system of social justice.

## Conclusion

In the academic debate about education for sustainability much has been made of the theoretical tensions between socially critical education espoused by Fien (1993) and Huckle (1993) and deep ecology advocated by Naess (1984). Whilst these two theoretical strands have clear differences in emphasis and ideology, both are transformational in the practices which they advocate. If deep ecologists can be persuaded that the eradication of social inequalities, which is preconditional to the establishment of an egalitarian view of the biosphere, is fundamentally a political process and if socially critical educators can be persuaded to appreciate that social focus is a means to the end not the end itself, then environmental education would be characterised by a model in which practice unites rather than divides. This achievement would be a major step on the road to developing the philosophical foundations of education for sustainable living. Affective education, in this context, is concerned with more than methodologies of pedagogy. Often the missing link is the lack of recognition that a vital element of environmental education is about learning to care. Caring, although it is essential, is not sufficient. The essential measure of success will depend upon the amount of environmentally sound, community based action which is initiated and sustained.

In achieving the fusion we are calling for there will have to be concert and compromise. And there will be significant barriers. Researching those barriers will give us all an important database on which to base our judgements about actions. Clearly in researching the barriers to implementing an education for sustainable living at community level we are also researching the barriers to our own personal development as active citizens, for we, as researchers, share the environment with the subjects of our research.

In trying to achieve this fusion we will have to remember that we have an inadequate understanding of individual's notions of the rational. Earlier we suggested that Hodkinson's (1995) concept of *pragmatic rationality* was a fruitful place to start the quest. This concept is derived from the work of Pierre Bourdieu. Bourdieu presents his readers with a theory of practice which treats social life as a mutually constituting interaction of structures, dispositions and actions whereby social structures and embodied (and therefore situated) knowledge of those structures produces enduring orientations to action which, in turn are constitutive of social structures (Postone *et al*, 1993. p. 4).

*Furthermore the active presence of past experiences, which, deposited in each organism in the form of schemes of perception, thought and action, tend to guarantee the "correctness" of practices and their constancy over time, more reliably than all formal rules and explicit norms* (Bourdieu, 1990, p. 54).

In other words, if understanding human behaviour is difficult, then changing it through a reorientation of individuals understanding of 'the rational' is doubly so! Much confusion and internecine warfare exists in environmental education because of the failure to see the distinction between strategy (paradigms or theories as visions) and tactics (prioritised actions) which emerges from intellectual practice based on advocacy rather than the search for consensus. A starting point at a community level has to recognise that priorities are likely to emerge from a dominant social paradigm which is based on the primacy of a normative ethic derived from a reductionist notion of economics, science and technology. In the process of bringing about change which would promote sustainable lifestyles it seems to us inevitable that critical perspectives will be negotiated which reveal the need for social transformation. Therefore, practice must initially be anthropocentric but may fail if this focus becomes the destination rather than the pathway to the deeper ecological understanding which is fundamental to sustainable living. The research implication of this analysis for education for sustainable living is the need to focus on proactive, prognostic action based research which illuminates solutions rather than reactive, diagnostic research which continuously reminds us of the problem.

In the title of this paper we asked whether it was possible to have an essentialist standpoint. We have also stated that sustainability is *the* post-modern challenge, and that a way of engaging with that challenge would be to (re-)place the socio-ecological crisis as the standpoint at the heart of educational research. These two invocations appear to be contradictory. In post-modern analyses there is no 'there' to have a standpoint from (Clough, 1994; Harraway; 1988). Secondly, the idea of a single challenge is clearly too privileging for post-modernism to cope with and appears to be a construction of a new meta-narrative to replace the meta-narrative of the Enlightenment, the challenge to which is central to the task of post-modernism. So is there any recovery from this paradox of contradictory invocations? In order to begin to answer this seemingly intractable question we would like to close this paper by drawing on the influential work of Jacques Derrida. In *The Other Heading* (Derrida, 1992) Derrida deals with a similar problem himself by questioning whether he can be a European without being essentially a European. He declares that he "feel(s) European *among other things*, would this be, in this very declaration, to be more or less European? Both, no doubt (Derrida, 1992, p. 83, stress in the original). Elsewhere (pp. 76-79) he identifies himself a an Enlightenment philosopher (in the social justice rather than the rationalist sense (see Hampson, 1968)), and in another text, *Specters of Marx*, he declares that "(t)here will be no history without ... Marx, without the memory and the inheritance of Marx" (Derrida, 1994, p. 13). So what we have here as an anti-Enlightenment, Enlightenment philosopher; an anti-essentialist, partial essentialist; an anti-standpoint, standpoint epistemologist. We would like to draw on this Derridean device to close this paper by arguing that our partially essentialist selves can call for a partially meta-narrative research standpoint and suggest that in calling for the re-placing the socio-ecological crisis at the heart of the post-modern challenge of sustainability for educational research we are doing so in the knowledge that this closing act is not an act of closure, since the finality of this final set of remarks is always contingent, always available to be made again, and always, of necessity, open to deconstruction.

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# Environmental education: at the cross-road of theory and practice

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## Abstract

Environmental Education in South Africa stands at a crossroad. Environmental educators need to consider what they are going to do with information gathered, theorizing and philosophizing indulged in over the past twenty years. Communities in South Africa are starting to place more and more pressure on environmental educators to transform this information into workable programmes within their local communities.

Tswaing Crater is an Environmental Education development project dealing with such transformation. In 1996 a trail was constructed for use by school groups for Environmental Education purposes. The development was undertaken with the assistance of the local community, teachers, school children, subject specialists and the educational officer at Tswaing. After a year it became clear that the teacher's guide in use was ineffective because school groups of 300 or more arrived at the Crater unprepared. At the end of 1997 the project was adapted and a station approach along the trail was suggested and is now being developed with the target audience's needs in mind. The stations and the training programmes, based on sound theoretical underpinnings, interact purposefully to fulfil the environmental education needs of the local community. The project shows that theory and practice meet at the crossroads, the place of implementation.

The changes to the initial project at Tswaing have to keep in mind criteria that ensure that Environmental Education theory and practice are brought together in such a way that the target audience of the project, the stations and the training programme interact purposefully to fulfil the environmental education needs of the local community.

## Introduction

Environmental Education in South Africa has reached a crossroad. The time has come for environmental educators to ask themselves what they are going to do with the knowledge they gained over the past years through investigating international and local theories and philosophies that underlie Environmental Education. Communities in South African society are starting to place more and more pressure on environmental educators to transform this information into workable programmes within their communities.

The Tswaing Crater trail can serve as an example of an Environmental Education project that was tailored to suit the specific educational, social, economic and political environment within which it would operate.

## The initial environmental education project at Tswaing

The aim of the project was to, not only provide an environment (the trail) in which teachers (facilitators) could impart knowledge, but also to provide them with an opportunity to develop outcome-specific programmes for their students. This entailed incorporating self-experience, participatory and discovery activities. Via this approach an attempt was made to create in the students an appreciation of the world of reality and, more pertinently, awaken a sense of understanding and appreciation for the broader environment in which a unique setting like Tswaing exists.

The project comprised two elements, namely, the teacher's guide and a tourist guide. The teacher's

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guide was compiled to give the teacher enough information about Tswaing. It also included instructions as to how to use it, giving detail on the trail and indicating possible activities that could be done along a specific section. These included preliminary and follow-up activities. Furthermore, it contains safety hints, materials needed for the activities, techniques that can be used on the trail, examples of worksheets and lists of fauna and flora found in the vicinity of Tswaing. Teachers could, for example, select activities from the teacher's guide or they could design their own programmes for their students. In conjunction with the compilation of the teacher's guide, a programme was structured and tour guides from the local area were trained to assist the teacher in facilitating the school groups on the day of the programme.

The development of the teacher's guide and the training of the tour guides were both done in close consultation with the parents, teachers, school children and subject specialists through regular forum meetings and training sessions. Their local inputs shaped both these elements of the project. After the training phase of the tour guides and the development of the teacher's guide, three trial groups of school children (grades 1 to 6, 7 to 9 and 10 to 12) went on the trail assisted by the tour guides. From this exercise it became clear that identifiable results of group dynamics come into play and cultural and language differences become significant influencing factors. Different environmental features meant different things to different groups. The different language groups had different names for the same object and had a variety of folk stories to tell about certain objects. These were then incorporated into the project. This exercise helped to enrich the project by putting a local touch to it. Moreover, it enabled the tour guides to point out that groups could represent up to nine different language groups. To overcome this individuals in the group were used as interpreters. The whole exercise pointed out where adaptions had to be made regarding walking distance, time spent on activities, making activities more suitable for the different grades, etc. After making all the necessary changes to the project, it started running in 1996.

However, a major problem soon emerged. Large school groups, up to 300 at a time, with pupils of different age groups would arrive at Tswaing unprepared for the programmes they were about to experience.

### The station phase of the Environmental Education project at Tswaing

At the end of 1996 it was therefore decided to try another approach to the project. The focus was then to identify a group of "*hot spots*" (special features) on the trail and group them together into 10 stations. After four visits to the trail by environmental educators, Tswaing education staff, community members and interested parties, six possible groupings (mini-trails) of the stations were decided upon. For each of these, programmes were developed for the different grades, depending on how suitable that part of the trail was for the particular age group. They were developed with assistance from local teachers, parents, subject specialists and the Tswaing staff. They were also placed in context of the new outcomes based education framework.

At the time of preparing this paper (January 1998) the programmes were not yet completed nor accepted by the local community. The pilot run of the programmes still has to be done to see whether they could be implemented in their existing format or whether changes are necessary. Tour guides have to be re-trained and newly trained, to assist with the programmes.

### Principles to keep in mind

The development of Tswaing's Environmental Education project to date has made it clear that it is important to keep certain principles in mind when developing Environmental Education programmes. Similar programmes have a number of issues to consider, namely, the target audience of the programme, the training of tour guides, the development of specific stations and the writing of the teacher's guide.

#### *Target audience*

With regard to the target audience it is necessary to:

- keep in mind the way in which the target audience interprets the local and wider environment;
- use the local community in as many aspects of the programme development as possible; and
- use the local community to physically construct the buildings and structures, to tell stories on tape, be tour guides, etc. - simply, to be involved.

*Training*

As far as training is concerned, to:

- train tour guides to help with facilitating programmes;
- train local teachers how to use programmes;
- train staff using programmes to understand Environmental Education and the principles underlying it; and
- provide training in outcomes based education (OBE) for teachers and tour guides.

*Stations*

At the stations it is important to:

- use local people to do construction work as and where needed; and
- use local people to build tool boxes and equipment needed at the stations.

*Teacher's guide*

While the teacher's guide is being prepared, it is advisable to:

- use locals to assist with compiling activities; and
- incorporate local interpretation(s) into the activities.

### Conclusion

In conclusion, even though Tswaing is a unique environment, in the development phase of the Environmental Education programmes certain principles were identified. These principles can basically be applied to other similar programmes. However, as was found, it is important to realise that these principles are flexible and must be adapted to the specific environment and its target audience where it is being implemented, in order to make it workable.

# Education for Environment and Sustainability

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"Education for Environment and Sustainability" is the term proposed as the most transparent and reconciling label to express at the same time the continuity and evolution of ideas in the way from Tbilisi (1977) and Moscow (1987) through Rio (1992) and Thessaloniki (1997) to the 21st century.

This was one of the major outcomes of the Conference, which was co-organised by UNESCO and the Greek Government with the organisational support of MIO-ECSDE and the University of Athens. The Conference was addressed by the Secretary General of UNESCO, Dr. Federico Mayor was attended by more than 1000 participants from 84 count
ries from all over the world.

The aforementioned point was only one of the highlights of article 11 of the Thessaloniki Declaration (UNESCO 1997) and it is important to elaborate it.

Though it has never been presented openly, to the best of our knowledge, there was an apparent conflict between two large "schools of thought" of educators, analysts and environmental or developmental experts. Each one of these schools covers a wide spectrum of positions.

The first school is of thought, more or less, the one which has its roots to Stockholm (1972) and, Belgrade 1975) and more specifically the Tbilisi (1977) UNESCO-UNEP approach. This is more or less the School of "Environmental Education " . According to this approach the environment is only one and covers globally all natural and manmade elements including human settlements (see Habitat I and II etc), socio-economic relationships and cultural aspects. In this respect, all human activities take place within it. Development, which could be described as a cluster of human activities, is taking place also in the Environment. This means that also, and particularly Sustainable Development should and could take place in the Environment with full respect and in a harmonious dynamic relationship with all its natural, cultural and socio-economic components.

In this respect, the so-called "Education for sustainability" or even the "Education for Sustainable Development" is a major part and component of the Environmental Education.

This approach is supported particularly by those educators who have followed closely the original Tbilisi teachings and have based their message to a holistic approach. It is known that many educators have included from the beginning analyses of the root causes of the environmental degradation (overpopulation, consumerism, wrong economic indicators and lack of awareness) as integral part of the Environmental Education Curriculum (Scoullos M., 1972, 1974, 1976) whereas Environmental Education was recognised in Moscow (1987) as an ideal carrier of the message of peace and international comprehension (Scoullos M., 1987).

It is true, however that in many other cases and in some countries Environmental Education was eventually confined only with conservation education or in some cases with outdoors education or specific aspects of education dealing with analysis of the problems created by pollution.

This intentional or not intentional reduction of the scope of Environmental Education was one of the reasons for searching for its reorientation towards sustainability. (UNESCO-UNEP, MIO-ECSDE, 1996).

The other School of thought derives mainly from the \ldblquote Our Common Future\rdblquote report and from Rio (1992) and more specifically form Chapter 36 of Agenda 21. Here the scope is to provide the necessary education in order to obtain the goal of sustainability or, in other language, of sustainable development. Sustainable development to be achieved a number of conditions should be met and a

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balance should be reached between environmental, economic, social and technological considerations. In such approach, Environmental Education is only one of the components of the "Sustainability Education" as this is viewed mainly in the framework of the UNCSD. This apparent major differentiation between the two approaches is not only philosophical. It might have practical, operational and financial implications at all levels concerned and could affect directly and indirectly the educational process and results.

However, in the understanding of most educators the ultimum message of both schools, irrespectively of their point of departure is similar if not identical: Removal or drastic reduction of the root causes and preparation of individuals and societies through a lifelong educational and awareness process for a participatory, balanced action at all levels. An action which is based on better understanding of the natural phenomena and the carrying capacity of the biosphere on one hand and on the other hand on an equal good understanding of the abilities and potentials of innovation and creativity of humans.

This combination, at the end of the day cannot be achieved without deep respect for nature, for man for others and self. Furthermore, it cannot be obtained without solidarity with all those needing help. In other words, we are asking for an education leading to knowledge, wisdom and ability for action. This is why the word Education has been put first and the adjectives for the specific purposes follow. The education for the Environment and Sustainability "EES" (The acronym EES has been used previously to signify a notion basically different from the present one) is not a term, which tries to superficially find an easy way to reconcile the two approaches.

It signifies a number of very important elements:

- It respects the origin of the whole movement and recognises the continuity and also the significance of the Rio results
- It demonstrates a willingness to terminate unnecessary rhetorics and polemics in a critical moment, when urgent, concerned action is needed
- It signifies the need to bring the methodologies, tools and dynamic into the "boat of Environmental Education, since very few "Sustainability Educators" exist while Environmental Educators are many and in most cases they are the best equipped and prepared to expand their spectrum of interest and analyse the new aspects, if these were not already in their teachings
- It encourages the synergy and complementarily of both approaches.

The Thessaloniki Conference should be remembered as an attempt to bring proper Education in the centre of the International Agenda in the eve of the 21st century. An attempt to implement in practises the very teachings of the kind of education we are preaching for.

It has promoted Education for Environment and Sustainability as the fourth major pillar for securing a better future, the other three being:

a) Legislation, which should be fully applied and enforced by Governments,
b) Economy, which should be increasingly motivated and characterised by respect for the natural and cultural capital on which it is based, and,
c) Innovation and technology, which should be well understood, properly used and fairly shared.

The fact that such an approach cannot be successful unless adequate resources are secured and extensive training and retraining schemes for educators are organised was also recognised in Thessaloniki as a prerequisite for any real progress

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# Outcomes Based Education versus the "old" approach: Using the best of both in Environmental Education?

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Outcomes Based Education (OBE) is to be incorporated in South African schools starting with grade one in 1998. Hence this approach needs to be considered in teacher education and in-service training with regard to EE (Department of Education, 1997:14). In contrast to the "old" traditional syllabus-driven system, an OBE system is based on the principle that decisions about the learning programmes should be driven by the outcomes which learners should demonstrate at the end of their learning experiences (Conradie, 1997:8). However, the success of the implementation of the new approach depends, among others, on the views teachers have of these approaches.

*Hence this paper addresses the question of what teachers' and teacher educators' current perspectives of EE are and how these can be reconciled with OBE or with the 'old' approach to education.* Accordingly the paper has the following aims:

- to highlight some identifying characteristics of current perspectives teachers and teacher educators have of EE;
- to analyse the views of a number of South African and Australian teachers and teacher educators on the usefulness of the frameworks for EE and
- to examine the implications of the aforementioned for teacher education within OBE or the 'old' approach.

## Theoretical perspectives in environmental education

Janse van Rensburg (1995:66) loosely clusters the perspectives teachers and teacher educators have of EE into three groups: *behaviourist, interpretavist* and *critical*. These three perspectives can be explained as follows:

### Behaviourist

Van den Aardweg and Van den Aardweg (1993:30) state that behaviourism is "a psychological theory and practice concerned with observable behaviour and the effects of conditioning on such behaviour". The theory maintains that the motivation for all behaviour is external stimuli rather than internal drives and claims that it is possible to control and manipulate human behaviour. Accordingly Bloom's taxonomy identifies behaviours (stated as objectives) to be developed with education. Hence, when working within a behaviourist approach, teachers' aims for EE focus on behaviour change and the acceptance of an ethical behaviour code by all individuals (Janse van Rensburg, 1995:66). Because behaviourism tends to quantify behaviour, teachers who have a behaviouristic approach evaluate students' work (products) quantitatively (and not qualitatively) and their teaching methods rely heavily on the transmission of information and the reinforcement of positive behaviour. According to Naidoo, Kruger and Brooks (1990:15-16), behaviourist approaches are also discipline-bound and uncritical, aimed at the cognitive development of learners through the use of textbooks and rote learning.

### Interpretavist

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According to Janse van Rensburg (1995:66-67), the interpretavist approach is based on constructivist learning theory, liberal humanism and US cognitive psychology. She further maintains that within the interpretavist perspective, aims involve actualising the potential of the 'whole' person by enabling people to develop according to their own needs and visions. Strategies and methods therefore comprise needs assessments followed by working with communities on practical problems. Methods include inquiry and experiential learning which involve non-prescriptive, non-rote and non-authoritarian group learning, employing a broad, cross-curricular approach where the teacher is seen as a facilitator. Within the interpretavist approach, qualitative (as opposed to quantitative) evaluation of students' work is suitable.

### Critical

A critical approach strives for the empowerment of the masses and social justice for all. Using critical pedagogics and social-constructivist theories as theoretical underpinnings, methods used include the articulation of community needs, encouraging learners to develop and empower themselves, sharing 'basic' knowledge, co-learning and dialogue, participatory research and democratisation (Janse van Rensburg, 1995:66-67). According to Naidoo *et al* (1990:15-16), the prevention and solving of environmental problems need an epistemology based on such a *critical* approach where teaching is characterised by, amongst others, cooperation, critical enquiry, interdisciplinary lessons and a learner-environment focus. Such an approach, which emphasises enquiry, group learning and the sharing of knowledge, lends itself to a qualitative evaluation of the whole process of learning by the students as opposed to a quantitative evaluation of the products of learning.

### A single perspective versus a pluralistic perspective

Higgs (1995:16) argues that one can align oneself to one or more theoretical perspectives. If one works within *one* perspective, this perspective will be "truly tried". In contrast, one can learn from *all* perspectives and use whatever seems helpful and valuable although a possible danger is superficial eclecticism. Higgs (1995:16) states that we "... are not condemned either to be imprisoned within a single perspective or to flit from one position to another" but should appreciate the contribution of each perspective. Campbell (1997) and Lebeloane (1997) share this view.

Janse van Rensburg (1995:65), however, refers to a pluralistic approach as an approach that accommodates "inconsistent views" and "contradictory underpinnings" or "a tendency ... to be eclectic...". The issue of a single versus a pluralistic approach to EE became part of the empirical investigation which is subsequently discussed.

## Research design

At the outset of the study the aim was to investigate the views of "experts" in the field of EE on a number of theoretical frameworks. A qualitative research design was considered appropriate for this aim, thus allowing for flexibility. This enabled the researcher to start small and, as her understanding of the research question grew, to cover the same ground with other participants and also employ additional research methods (triangulation). In this way the design was emergent. Eventually the investigation followed three cycles of enquiry with three groups of participants (28 in total) over a period of two years. Each cycle involved stages of planning, data collecting and reflection, similar to an action research design (Kemmis, 1988).

A method of purposeful sampling was considered appropriate for choosing the first group since this allowed for the selection of information-rich key informants (Schumacher & McMillan, 1993:378). This first group consisted of three experienced (and well-known in South African EE circles) teacher educators (referred to as Group TS in the remainder of the article). Interviews with them were conducted at a two days workshop for teacher educators of EE. The interviews were open-ended but focused on the diverse theoretical frameworks and were tape-recorded for later analysis. From this inductive analysis certain tentative categories and patterns emerged. To ensure reliability of the research, the coding was checked and rechecked to see if the analysis was done consistently (Schumacher & McMillan, 1993:385). The results were then used to make decisions for further data collection and this resulted in the construction of an open-ended questionnaire which was used in the second part of the research.

The second part of the research (with Group TA) took place in Australia during a study tour which focused on teacher education in EE. Once again the method of purposeful sampling was employed in that six experienced teacher educators as well as two teachers teaching at eco-schools were identified by the President of the Australian Association of Environmental Education for participation in the study. They completed the open-ended questionnaires which were structured according to predetermined categories in accordance with the results from the first part of the investigation. The questions requested teachers' and teacher educators' views on certain aspects of the aforementioned theoretical frameworks. For example, questions concerning choice of aims, teaching methods and means of evaluation were asked, since these areas are influenced by preference for certain theoretical frameworks. Other questions focused on participants' predilections for *a particular* theoretical framework over others and justification for this choice. Finally the participants were asked what their views were on the use of a single versus a pluralistic approach to EE. To ensure validity of the interpretation of the responses, this method was complemented by means of interviews with the same participants directly after they had completed the questionnaires. In some instances the analysis was checked with participants from the first and the second group to verify validity (Cohen & Manion, 1994:241). Analysis of the results led to the third cycle of the investigation.

The third part of the research took place in South Africa. Group S involved all the students (17 in total and all practising teachers) of a module of a further diploma in EE. Entrance requirements for this diploma are matric plus three years of formal education and one year of teaching experience. As part of the prescribed course the students study, amongst others, the three theoretical frameworks already mentioned and their implications for EE. As a compulsory assignment the students are then requested to complete all the activities in a workbook and send them in for evaluation. Some of the activities require students to voice their opinions (with justification) on several aspects of the theoretical frameworks they study, as well as their views on a single versus a pluralistic approach to EE in schools.

## Discussion of results

Data analysis was an ongoing process integrated into each cycle of the research. Inductive analysis led to the emergence of categories and patterns and eventually to the following synthesis of the data with regard to *aims; methods; evaluation; choice of theoretical framework and preference for a single versus a pluralistic approach.*

### *Aims of EE*

The views of the majority of the participants were in accordance with the interpretavist, and more specifically with the critical approach to EE, and consequently considered skills (such as critical thinking, problem solving and action skills) as important. Regarding thinking skills, a participant from Group TS said of his students: "I want to see evidence that they are considering the issues. I place enormously high value on people thinking open-mindedly, analytically ... taking ideas apart ...".

Some participants expressed the belief that skills develop *as a result* of action. For example, in Group TA it was stated:

> " I view taking action to solve an environmental problem as a major aim of EE. As you encounter the problem, awareness, knowledge and skills such as critical thinking and problem solving develop or increase."

In contrast to this view, a participant from the same group stated that:

> "*To enable* (own italics) learners to act, it is important to develop knowledge, awareness, attitudes and values as well as skills to participate in solutions of environmental problems."

Another participant from Group TA thought that "... awareness and knowledge were important to result in behaviour change ...", thus indicating a more behaviouristic approach to EE at school. Regarding knowledge, a participant from Group TS also stressed that " ...any good teaching will involve lots and lots of facts and transmissive knowledge as well," while another from the same group stated: "I don't believe that teachers teach in a vacuum or that they think in a vacuum. You think in terms of knowledge bases you have. Out of that knowledge comes understanding, etc ...." The value of a good, solid knowledge base was also mentioned by another participant from Group TS and by the majority from Group S.

In summary, participants viewed the acquisition of skills, such as critical thinking skills, as important. This is in accordance with a critical approach. However, there was also the belief that the acquisition of skills should be complemented by transmissive knowledge which is more typical of a behaviouristic approach.

### *Methods*

The participants from Groups TA and TS mentioned that they valued the use of group work, although one said that this depended on the age of the group as well as the nature of the problem. Other methods which were mentioned by several included those with a problem-solving focus and involvement in local issues and communities. However, such a focus on problem solving was seen as a "negative approach" by someone from Group TS. Other methods mentioned by Group TA included "... sensory approaches" and "... the use of the outdoors" while another from the same group expanded on this aspect as follows:

> "I think the link between theory and practice is often overlooked in regard to learning. For example, what is the point of community activism if you don't know why - is the learner not fulfilling the teacher's agenda? Likewise, what is the point of theory on critical thinking skills if you don't feel confident in implementing this?"

A participant from Group TS stated that "... teachers should be *responsive* to the learners and their needs." He also suggested that good teaching involves the transmission of knowledge. This sentiment was echoed by participants from Group S.

Here, participants favoured active learning which could involve investigating problems in local communities. This is in accordance with the interpretavist and critical approaches. However, mention was also made of the lecture method which may be seen as behaviouristic.

### *Evaluation*

Most of the participants from Group TA mentioned *qualitative* and *project based* assessment, which is appropriate within interpretavist and critical approaches. Two participants from Group TA referred to *product* as well as *process* evaluation whereas the majority of the others also stated a preference for the evaluation of the whole *process* of learning. A participant from Group TA elaborated as follows:

> "The processes of reflection and action are mechanisms for evaluation. These also include elements of skills development for assessment - conducting an inquiry, drawing conclusions and making comparisons."

A number of participants from Group TA were of the opinion that teachers are not taught how to evaluate EE in schools. For instance, one stated that "... in many places EE is not evaluated very well because, in part, attitude changes are hard to measure." In addition, another expressed the thought that the use of a wide range of evaluation techniques can be inhibited by "lack of funding".

In accordance with Group TA, participants from Group TS said that they tended to go for subjective, qualitative evaluation, although "... there is a place for quantitative measurement as well ...". The majority from Group S also indicated that they thought quantitative evaluation was useful to some degree.

An interesting viewpoint was expressed by one participant from Group TS. He saw evaluation as limiting if seen as a separate entity rather than as embedded in everything that happens in the classroom. "We find the model of *dialogue, encounter* and *reflection* extremely useful to evaluate and critique all EE situations. In any lesson one can ask: what is the level of dialogue? Who is talking to whom and about what?... Regarding encounter: are there real life encounters with topical issues?... And regarding reflection: what is the quality of thinking about what we do and how we interpret dialogue?"

The above seems to indicate a preference for process (i.e. qualitative) evaluation. This links well with the interpretavist and critical approaches. However, there is also the feeling that there is still a place for quantitative measurement as is used in a more behaviouristic approach to education.

*Choice of theoretical framework*

Of the participants from Group TA, only two expressed a preference for the social critical paradigm as opposed to the other theoretical frameworks, while five of them indicated that they found *all* the frameworks useful, justifying this as a *practical* approach. This is, for example, reflected by the following statement:

> "I would choose the most appropriate for the task and situation. I would favour however, an interpretive or socially critical approach."

While some participants from Group S preferred one framework over the other, they generally felt that they would use what was useful from any of them. A participant from Group TS summed up his ideas about "choosing" a theoretical framework with the words:

> "It is too technicist and mechanistic to divide and separate the frameworks ... You can't really say now I'm at this framework or now I'm at that framework ... or to say I'll take bits of each... It is like seeing the human mind in little separate blocks ... It's a very rationalistic approach...the idea that humans are rational things like computers, that humans learn in certain ways and that we should teach them in certain ways ... that reduces the human capacity ... people are much bigger than that"

He did not feel that it was important for student teachers to learn about particular frameworks and their implications for teaching: "Some of the best teachers seem to respond naturally to children ... We need to encourage the natural intuition of teachers and not destroy it with technicist ideas ..."

In contrast, another participant from Group TS expressed his belief that teachers should make a decision in this regard. As a "liberal humanist" he "... believes in a market place of ideas" although this did not mean that "... everything is equally good as everything else." Hence, in teacher education he makes certain that he exposes his students to *many* viewpoints.

The aforementioned clearly indicates that participants felt that there is something useful in *each* theoretical framework, even though they may have a preference for one framework over the other.

*Single versus a pluralistic approach*

All eight of the participants from Group TA indicated a conviction for the use of a pluralistic approach. Cited as the main reason for this belief was the fact that EE practice was too complex to be restricted. For instance, participants said "... theory is more coherent than practice ..."; "... meaning is complex and multidimensional...drawing on multiple approaches is one way to keep the complexity of the issues visible ..."; "EE is too broad, it ranges across ages and disciplines and shouldn't be confined by *a* theoretical framework".

Other statements that were made by participants from Group TA referred to the fact that teachers often use behaviouristic approaches even though they are supposed to use novel approaches. One stated:

> "Although I draw most of my work from a critical paradigm, ... at times it is necessary to work within the more mainstream teaching traditions to fulfil requirements for assessment".

Two others from Group TA also mentioned the fact that teachers needed to have an understanding of *all* the paradigms in order to "begin where the system is", thus indicating that elements of behaviourism may still be present in the education system of Australia.

Amongst the participants from Groups TS and S, the conviction that teachers should follow a pluralistic approach to EE was also clear. In contrast to the participants from Group TA who preferred a pluralistic approach because of the complexity of EE, reasons for such an approach mentioned by the participants from Groups TS and S can be classified into three categories: those related to (1) the *theoretical frameworks*, to (2) *learner characteristics* or to (3) the specific *situation or context* in which the learning takes place.

Regarding the *theoretical frameworks*, seven participants from Groups TS and S believed that the frameworks supplement each other and hence a teacher should use what is worthwhile and practical from any of them. One explained it as follows:

> "One should use and follow a pluralistic approach because then the paradigms complement each other's shortcomings to give a fairly representative coverage of all the ideas tackled."

Another from Group S felt that teachers should work within a pluralistic approach "... because each one single paradigm has advantages and disadvantages". For instance, according to his view an *advantage* of the behaviourist approach is the fact that teachers need not be involved in the planning of a curriculum because this should rather be done by 'experts'. On the other hand he believed that a *disadvantage* of the interpretavist approach was the fact that many teachers may have difficulty in working with communities concerning practical problems, enquiry and experiential learning, as is required in the interpretavist approach.

Still another participant from Group S mentioned the fact that the paradigms supplement each other in the sense that, for example, the aims of behaviourism ("... to change people's attitudes and behaviours") may be achieved by an interpretavist approach where "... the teacher is a facilitator and learners are active participants ...".

With regard to *learner characteristics* four participants from Group S stated that a pluralistic approach should be followed to accommodate different types of learners. A participant from this group declared:

> "I believe that the use of a particular paradigm depends on the mental development of a particular target group, for example, at local level it may be proper to use a behaviouristic approach ..." .

Regarding the *situation or context of learning* one participant, also from Group S, was of the opinion that this dictated which framework the teacher should use. She asserted:

> "The teacher can use a behaviourist or interpretavist approach and if this fails, he/she can change to the critical paradigm and maybe it can be effective and according to the conditions or situations in which he/she uses the paradigm."

In summary, participants from all three groups preferred a pluralistic approach to EE.

**Implications of findings in the context of OBE**

The identifying characteristics of the "old" approach in contrast to OBE have been highlighted as follows (Department of Education 1997:6-7):

| old | new (OBE) |
|---|---|
| passive **learners** | active **learners** |
| exam driven | learners are **assessed** on an on-going basis |
| rote-**learning** | critical thinking, reasoning, reflection and action |
| syllabus is content based and broken down into subjects | an integration of **knowledge**; learning relevant and connected to real-life situations |
| textbook/worksheet-bound and **teacher centred** | **learner-centered**; teacher is facilitator; teacher constantly uses groupwork and teamwork to consolidate the new approach |
| sees **syllabus** as rigid and non-negotiable | **learning programmes** seen as guides to allow teachers to be innovative and creative in designing programmes |
| teachers **responsible** for learning; | learners take **responsibility** for their learning; |
| **motivation** dependent on the personality of the teacher | pupils **motivated** by constant feedback and affirmation of their worth |
| emphasis on what the teacher hopes to achieve | emphasis on outcomes - what the learner becomes and understands |
| content placed into rigid **time**-frames | flexible **time**-frames allow learners to work at their won pace |
| **curriculum** development process not open to public comment | comment and input from the wider community is encouraged |

The question is: how can teachers' and teacher educators' perspectives of EE, as discussed in the preceding paragraphs, be reconciled with OBE?

Some of the views teachers and teacher educators have of EE seem irreconcilable with OBE. For example, participants agreed that aspects of a *behaviouristic* approach which were still useful in EE included the transmission of factual knowledge and quantitative evaluation, when appropriate.

The *interpretavist* perspectives of EE expressed by teachers and teacher educators can more readily be reconciled with OBE. Examples include their conviction that learning should be relevant and connected to real-life situations; the teacher should be a facilitator using group work; learners should take responsibility for their own learning, and comment and input from the wider community should be encouraged. Some *critical* perspectives of the participants also link more easily with OBE, for example the view that education should be learner-centred and involve critical thinking, reasoning, reflection and action and should welcome community input in the development of the curriculum.

As indicated, some of the views held by teachers and teacher educators concerning EE can be readily reconciled with OBE. However, teachers may be forced by practical realities to sometimes work outside of an OBE approach and use whatever is valuable from other approaches, even though this may seem irreconcilable with OBE. For instance, within OBE, knowledge of water pollution may best be acquired by investigating a nearby water resource in groups. However, with big classes and/or few resources (which, in this case may be lack of water test kits or a nearby water resource) this may be an impractical if not impossible approach to use, forcing the teacher to think of other alternatives. Within OBE continuous assessment and evaluation of the process of learning is also required. However, the simple fact of a shortage of stationery in many schools in poor, rural areas may inhibit this ideal, once again forcing the teacher to use other methods of evaluation.

Apart from the lack of resources, there are also differences of opinion regarding which aims are important in EE. Skills (critical thinking, problem solving and action) are viewed as important outcomes and this is in accordance with OBE. However, participants felt that these skills need to be complemented by a solid knowledge base which may, amongst others, be acquired by the traditional transmission of factual knowledge, even though this is irreconcilable with OBE. Reasons mentioned for this perspective include the fact that factual knowledge facilitates understanding of issues and is the tool that *enables* critical thinking about issues. It would be impractical to think that *all* knowledge could be acquired through the investigation of real issues in local communities (as is recommended within OBE) for many reasons, not least of which is time constraints.

## Conclusions

It can be concluded that although teachers will work within an OBE approach they will still have to be introduced to a number of diverse theoretical frameworks during teacher education to enable them to use aspects of the "old" approach to education - when necessary. Understanding a number of frameworks (of which three were discussed here) in terms of their theoretical underpinnings and implications for methods enables teachers to think about what they do and the way they do it, and to reflect on their own thinking. It may also improve and motivate discourse about education in general and EE in particular because it provides teachers with the language and the concepts to do so.

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# Researching Participation and Participating in Research; Essential Dimensions of Education for Sustainability?

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**Abstract.**

The ultimate evaluation of education for sustainability (EfS) will be its success in encouraging and sustaining increasingly sound environmental practice. UNESCO (1997) could not have put it more clearly.

*'..the effectiveness of awareness raising and education for sustainable development must ultimately be measured by the degree to which they change the attitudes and behaviours of people as both consumers and citizens. Changes in lifestyles as reflected in individual behaviour, households and at a community level must take place. Particular emphasis is given to wasteful consumption patterns.'* (p 4).

Clearly schools and teachers have a leading role to play in this process, but teachers need assistance to implement EfS in schools. Furthermore the implementation of EfS will be promoted by research which illuminates the sociological and managerial processes which appear to be most successful in promoting EfS in schools. The implementation of EfS will also be enhanced if this research can also highlight the benefits of practising EfS in schools, especially if these benefits are couched in the very language of inspection and assessment that is increasingly used to measure the quality of educational provision.

The paper is based on two main propositions. First that the in-service professional development of teachers for EfS has got to be focused in schools. Second that the research approaches best suited to identifying the benefits of implementing EfS and the organisational culture and processes which facilitate it are those which take a cultural or micro-political perspective.

The research outlined was designed to monitor the impact of the SEEPS Project, (Sustainability Education in European Primary Schools, a school focused in-service programme funded by the DGXI of the European Union) on a cluster of primary schools which feed one secondary school in a rural part of Stirlingshire in Scotland.

The paper is divided into three sections:

1. A justification of the school focused approach to the in-service professional development of teachers in EfS.
2. A rationale for cultural and micro-political research into school focused EfS.
3. An outline of the research design and methods being used in the project.

## School Focused INSET; A Model for Education for Sustainability.

*'Meaning cannot be masterminded at a global level. It is found through small-scale pursuits of significant personal and organisational goals. The school is the "center" of change.'* Fullan, (1991, p. 348).

*'It is now widely recognised that the success of curriculum innovation, whether internally or externally initiated, is contingent upon the professional development of teachers.'* (Blenkin et al. (1992) p. 55).

Teachers become involved in in-service professional development (INSET) for a number of reasons; to improve their subject knowledge or their knowledge of teaching methodologies, for a career motive, for example in following a course in educational management, for personal reasons, for example in gaining

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an outdoor education qualification or to meet a whole school need, such as positive management or an anti-bullying policy. We contend that INSET in EfS is fundamentally concerned with whole institution approaches in which the curriculum, institutional practice and monitoring and evaluation are integrated and coherent. The SEEPS Project was designed to facilitate this whole school approach to EfS.

Three modes of INSET are prevalent in relation to whole institution needs:

i. Centralised; where teachers attend a course, run at a centre and taught by an expert advisor, inspector or lecturer.
ii. School based; delivered solely by school staff, sometimes supported by an external training pack.
iii. School focused; which follow a training the trainers approach and where materials are provided to support the trainer in school. An attempt is made to establish local, regional and national support networks.

The SEEPS Project attempted to avoid some of the pitfalls associated with centralised, black box, top down INSET provision. This approach sees change as externally driven and does not consider how institutional factors in schools influence change, neither does it equip teachers with the skills to manage change within their own school. In some narrower content and methodological areas, such at the teaching of reading or mathematics, where the target of the INSET is the classroom teacher, this approach can be successful. But in the field of EfS, where the whole school is the target for change, it is a model with severe deficiencies. as Fullan (1991) indicates, (Table 1).

**Table 1. Reasons for the Failure of Centralised INSET.** (Fullan, 1991).

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1. One off workshops are widespread but ineffective
2. Topics selected by people other than those for whom the in-service is intended
3. Follow up support for ideas introduced through in-service occurs in only a small number of cases
4. Follow up evaluation is rare
5. In-service rarely addresses individual needs and concerns.
6. Most in-service programmes involve teachers from a variety of schools. These programmes often fail to recognise the different impact of positive and negative factors within the schools to which these teachers return.
7. A profound lack of a conceptual or theoretical base in the planning and implementation of INSET that would increase its effectiveness.

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However, as Blenkin et al (1992) point out, much school based INSET is founded on the pooling of ignorance. Hewton (1988) identifies further disadvantages of school based INSET. Parochialism; when schools and/or individuals find difficulty in learning from the experiences of other schools and/or trainers. Another problem is that the range of INSET activities is limited by the resources and expertise of the school's staff. A third difficulty is that INSET needs are frequently only seen as those which are internal to the school, resulting in a myopic focus which overlooks or neglects external circumstances. Who is INSET for the school or the teachers? Unless the answer to this question is clear, the interests of the latter may override the former or vice versa.

Other problems have resulted from the increase in school based INSET which has followed the move to local management of schools in the U.K. and other European countries. Firstly many administrative tasks, such as routine departmental or staff meetings, are regarded as INSET. Secondly, schools are not necessarily adept at identifying long term needs or needs which relate to their local environment; they tend understandably, to be preoccupied with the latest curriculum or inspection initiative from central government, or strategies which will improve pupils' scores in national tests.

Most school based approaches also assume that good teachers are automatically good trainers, an assumption which Evans (1993) challenges.

> *'As many of the agents in SBI[1] are teachers or former teachers, this is not always the case; they have to beware of not becoming the 'know all' but the guide who is going to help the participants onto the right track. It is stated that in many situations the agent's lack of expertise in team leadership and in presentation and communication skills has an adverse effect on the training programme.'* ( p. 22).

The most evident conclusion from these observations are that geographically and contextually INSET for EfS has to be school focused, but this process has to connect with the wider environment (Smyth, 1995). The increased local management of schools and INSET also makes a school focus a pragmatic necessity. Research (SEEPS 1997) revealed that school based approaches, using three main sources: local government, school staff, sometimes working in networks, and radio and TV, were the dominant mode of INSET in the UK. This research also produced a demand for support materials for INSET in EfS.

For most people, and especially children, the local is their most significant action field; their local actions have global character. By drawing parallels with other local communities, local action becomes a microcosm of the global (Vognsen, 1995). Therefore the clear focus of INSET in EfS is local school development (Evans, 1993) or job embedded (Eraut, 1986).

A school's environmental improvement is clearly intended to benefit pupils, but we have to remember that schools are also workplaces for teachers and support staff. School focused staff development has therefore got to benefit several groups: pupils, teachers, support staff, parents, school boards or governors. Therefore INSET designed to promote EfS needs to be context based and relevant, and staff development has to focus at the school level. For EfS to be most effective, schools also need to be more fully integrated into their local communities and to make global connections from these local links .

*'If schools are granted greater autonomy, as proposed above, significant reforms could take place within schools or even classrooms, rather than at the national, provincial or district levels.'* (UNESCO, 1997, p 27).

School focused INSET offers solutions to many of the difficulties that Fullan identifies (Table 1), particularly if this school focus ensures that staff development creates individual and organisational habits and structures that make continuous learning a valued and endemic part of the culture of the school; in short the school becomes a learning organisation. As Evans' definition below indicates, a school focus, besides creating the opportunity for local derived action, also addresses the needs of schools and individuals.

*'It is school initiated in service education and is derived from the curriculum needs and plans of the school. It may focus on the school as a whole or in part (eg a subject department) as well as providing for the individual teacher's in service needs to be met..'* Evans, (1993, p. 12).

Hewton (1988) identifies two other advantages of school focused INSET, of particular relevance and importance to EfS. Firstly, schools as learning communities would identify and solve many of their own problems, Secondly, schools, sufficiently motivated by the greater sense of control and direction they have over their own affairs, will find the resources to support INSET.

Change, if it is to be successful in stimulating and maintaining EfS, requires collaboration not just within the school organisation but also with other schools, external advisors and resource bases. In short, support networks are required which will assist schools in navigating their way through the helix that is change. The monitoring and evaluation of change against external criteria such as good practice in other schools and/or normative models can be a significant boost to an organisation's confidence. Without these external connections the motivation and progress of all but the most robust organisations towards EfS will evaporate.

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[1] SBI School based in-service education.

*'The after sales service is a matter of paramount importance for the success of SBI.'* Evans, (1993, p.23)

In order to encourage EfS, its benefits and the approaches to the management culture in schools which are most likely to realise these benefits have to be researched rigorously and robustly. Thus research into the implementation of EfS has to be school focused for reasons already outlined; it also has to be research which produces knowledge with and for educators. Our contention is that working with and for educators within schools to identify processes which promote EfS and the benefits of EfS requires a cultural and/or micro-political approach.

**A Rationale for Cultural and/or Micro-political Research in Education for Sustainability.**

*'The relationship between curriculum and teacher development is essentially dialectical.'* (Blenkin et al, (1992) p. 111).

EfS clearly involves change in many of the practices of schooling. The majority of writers in the area would see this change as transformatory rather than reformatory; change in the cultural core and deeper structures of the curriculum rather than change which absorbs the language of reform without its substance; substantive, colonisation change rather than superficial, reorientation change (McLaughlin (1991), Blenkin et al. (1992).

There are many perspectives which can be taken on change in schools: technological, cultural, micro-political, biographical, structural or socio-historical. Cultural and/or micro-political perspectives we believe to be the most effective approaches for distinguishing between deep and shallow change in schools. Cultural and micro-political perspectives are also more inclusive and holistic than current top dog, top down, organisational and systems theories (Ball, 1987, O'Hanlon, 1996) which see conflict as pathological and aberrant. Cultural and micro-political approaches also focus on actors' socially constructed perspectives of EfS.

Research based on systems and organisational theory (which are essentially mechanistic rather than organic in their approach towards change) fails to recognise the peculiar nature of schools as organisations. From a research perspective, organisational and systems theory prefer conceptual tidiness to the messiness of empirical research in schools and neglect description in favour of prescription (Ball, 1987). It is important not to mistake the frenetic activity of reorientation change or reform for real structural and values changes associated with colonisation change. By studying the school as a social organisation this distinction is much more likely to emerge.

A micro-political perspective examines the strategies of power and influence which individuals and groups use to further their interests. This perspective has four main dimensions:

1. The study of change.
2. Social systems, fragment into interest groups which have their own particular goals.
3. Different interest groups converge around divergent value positions and conflicting interests.
4. The study of the interaction between interest groups and the conflict processes by which one group seeks to gain advantage over others.

The micro-political view gives priority to the actors in the social situation, in this case teachers and support staff, rather than starting from the model of the school as an organisation.

*'What are to count as data in the exploration of the school as an organisation are the views experiences and interpretations of the social actors involved. In this case those actors are almost exclusively teachers.'* (Ball, 1987 p. 26).

In micro-political analysis, the headteacher is a central figure; the critical reality definer, whose task is to balance control (domination) with order and commitment (integration). The head's leadership style or combination of styles and the nature of the participation of staff in the management culture of the schools are central research topics in cultural or micro-political analysis. A particularly important research focus in EfS is the nature of the participation of pupils in the decision making culture of the schools (Hart, 1997). What both the cultural and the micro-political views recognise is the importance of informal social networks and interactions in school decision making; committees and meetings may often only be symbolic of an ideology of participation.

*'Ideal heads, it would seem, must combine strength with openness, be able to assert their own views and ideas while taking full account of the views and ideas of the staff.'* (Ball, 1987, p 158)

But there are dangers in both cultural and micro-political perspectives. While the role of the head is significant, it is important to recognise that change is located within a broader policy framework (SOEnD, 1993, 1995). There may be a statutory national, regional or local requirement to provide EfS, or environmental practice may subject to external; inspection. The existence of a national curriculum will provide a significant epistemological framework inhibiting or encouraging EfS. Neither England nor Scotland has a statutory requirement for EfS, but the subject discipline ordered curriculum of England could create a less favourable environment for the implementation of EfS than the multi-disciplinary structure adopted in Scotland, where Environmental Studies is one of the five curriculum areas for which national guidelines exist.

While it is important to recognise external policy influences, we must also not lose sight of the local context. Provision will differ at the local level because of local factors, not just because of idiosyncratic responses to general trends or patterns. Research must convey this sense of community, locality or setting not just to provide thicker description, but also to generate hypotheses. Woods (1996) refers to this linking of the macro and micro as a classic problem of sociology.

*'The second aspect of locality relates to this latter point: that is, the failure of policy research to convey a sense of region, community or setting. But this is not simply a point about empirical description, although more of this would be welcome, it is also about theorization.'* (Ball, 1997, p 267).

Research into change in EfS, and especially environmental education(EE), has often been single focused. This type of research has limited applicability because it does not consider other competing factors, such as workload issues, within schools. Most teachers donot regard EfS as the meta cross curricular permeating theme, but at best, as one of a number of cross curricular themes competing for curricular time. Many teachers also regard cross curricular themes as less significant than subject orders or guidelines relating to discrete areas of knowledge, such as mathematics, partly because these are subject to external inspection and/or assessment. But conversely the organisational culture of the school has to be considered as a very influential internal change force.

The research design outlined here is both micro-political and cultural in focus, because most of the schools involved in the research are small primary schools. Conflict, which is the key feature of the micro-political approach, cannot always be anticipated. Most micro-political research in schools has been done in the secondary sector where schools are larger and more fragmented by departmental structure. Cultural research sees consensus as desirable; the limited size of the schools in the study and their largely female staffing may produce an environment which is more democratic, facilitating and inclusive.

*'In collaborative cultures deeply held beliefs - the sacred norms - are more likely to be exposed. It is perhaps in order to minimize conflict that collaboration tends to focus on those areas of school life that are largely peripheral and uncontested. From a cultural perspective collaboration is perceived as a desirable end in itself; from a micro-political perspective questions are raised concerning the ends and interests it serves.'* (Blenkin et al. (1992) p. 52)

*'Teachers in a given school need to acquire a set of specific understandings about what is required of them, not only in terms of skills and techniques but also values, attitudes and beliefs, in order to be a competent member of an ongoing social group,'* (Acker (1990 p 261)

Adapting the design to cover both cultural and micro-political interpretations has not affected the research methodologies, but it did broaden the context of the research and the interpretation of actors' perceptions. Cultural studies are concerned with the social lives of actors inside and outside the school context. The concern in this research was with the influence which external social existence might have on the internal micro-politics and/or culture of the school with specific reference to the implementation of EfS. Cultural approaches also recognise that children interpret the world in different and distinct ways from adults, not because of developmental deficiency, but because they grow up in an independent and authentic culture of childhood (Davies, 1982).

*Pupils are not just receivers or consumers of knowledge but constructors of shared meanings in a combined exercise with teachers.'* (Woods, 1996, p 39)

Ball, (1997) raises a major problem in designing research to investigate the impact of policy change. Central to the research described here are the processes and benefits of implementing EfS using the SEEPS Project, at the request of a local education authority. But at how much time should elapse before it is legitimate to draw conclusions about the effect of this policy? Are all the schools in the network willing participants? While there was no coercion, some schools might seek involvement because of vested interests in other aspects of local authority patronage, rather than an interest in EfS itself. The adoption of the SEEPS Project is only one aspect of change, values and some practices will change much more slowly

It also seemed appropriate to anticipate that the research might reveal exemplary practice, revealed in the high levels of participation by pupils, teachers, support staff and other actors. Ball (1987) sees school democracy as the alternative to the conflict focus of micro-political approaches. Hart (1997) believes that the participation of children in this type of education is crucial to their appreciation of democracy. The research design had to consider the possibility that this participatory or democratic education might be encountered; but what would this style of education look like?

*'This is an education that seeks competence as well as community, that enables all people to find and act on who they are, what their passions, gifts and talents may be, what they care about, and how they want to make a contribution to each other and the world.'* (Darling Hammond, 1996, p 5)

*'A democratic curriculum , in Dewey's sense, must be open to the continuous evolution of knowledge and values; it must alert pupils to that continuous evolution; and it must invite challenge to whatever seems to be the prevailing orthodoxy in any sphere.'* (Blenkin et al. (1992) p. 22).

Democratic schools then would support teacher collaboration and shared decision making, they would have structures which cater for caring and serious learning, they would have shared exhibitions of student work (Darling Hammond, 1996), they would be critical, inclusive in their organisational culture. This prescription gels well with the principles of EfS (Sterling, 1996, UNESCO, 1997).

**Research Design and Methods.**

The research has five major objectives:

1. Identifying barriers to the implementation EfS.
2 Identifying strategies to overcome or dissolve these barriers.
3. Monitoring the impact of the SEEPS Project on school focused INSET.
4. Identifying the aspects of school culture and ethos which assist the development of EfS.
5. Identifying the benefits of EfS.

Figure 1 shows the research design. The methods employed are eclectic, based on the belief that specific research methods are not the fundamental monopoly capital of any specific theoretical position. The need to provide empirical information is also a recognition that what can be quantified has significant credibility within current educational ideology. Eclecticism is also partly based on the belief that the methodological distinction between the qualitative and quantitative is often one of degree rather than kind.

*'All quantification involves judgement as to qualities and all qualitative statements invoke hierarchy, number and amount to give shape to meaning.'* (Davies, 1982, p 290)

The first area in the research is a questionnaire used in the design phase of the SEEPS Project. This contributes to a situational analysis of schools in relation to current INSET provision and needs. The second area is an analysis of the school's self evaluation report, (SOEID, 1996), where this has been completed. The view that EE/EfS is just another cross-curricular theme is an established barrier to its implementation. Because it is perceived that EfS has to be assessed in its own terms, EfS means more work for already overloaded teachers. A more productive strategy is to view EfS as good education which shows up positively using existing inspection and evaluative criteria and performance indicators (SOED, 1991, 1992 a, 1992 b, 1993). The search for separate performance indicators for EfS may be a self defeating strategy for many but the most committed and robust schools.

The third area; audits of the physical environment of schools continues the situational analysis. It was decided, that if possible, all the primary schools in the network will target a limited number of institutional practices for change. An objective of the INSET is for the schools to design a survey of these areas of institutional practice which will involve pupils as researchers, a crucial dimension of democratic education as Hart (1997) sees it. The first three areas, besides supplying a situational analysis, also provide a partly empirical baseline against which the effects of the implementation of EfS through the use of the SEEPS Project can be judged.

*'At the same time, through their community research and action, children will develop a sense of shared responsibility and skills that will enable them to continue to participate as adults and to recognize the importance of their participation in local, national and even global environmental decisions. This fundamental democratization of children is the most important aspect of their participation in the environment of their communities, more than the particular impact of any of their projects.'* (Hart, 1997, p 8)

The fourth and fifth areas are the heart of the cultural and micro-political research. Littledyke, (1997) identifies some of the factors which affect the culture and micro-politics of schools: teachers' beliefs in childhood and how children should be treated, the head's leadership style and management skills, the size, age range and type of children in the school, the community served, the physical setting and the available resources.

*'The interview, therefore, is not just a device for gathering information. It is a process of reality construction to which both parties contribute and by which both are affected.'* (Woods, 1996, p 53)

Interviewing is the most appropriate method for revealing the way these factors interact to influence the organisational culture of schools. Interviews with adults are individual and semi-structured. Respondents are informed of the question topics beforehand to give them a greater opportunity to prepare their responses. These interviews examine teachers' roles within their school as individuals, classroom practitioners and members of a school community. Group interviews were considered to be the most appropriate strategy for the research with pupils (Ball, 1985). The main focus of this research was pupils' level of participation in school activity and their perspectives on the culture of the school.

*'The use of group interviews, Davies suggests, actually provided for a re-creation of the relationships, cultural meanings, standards, roles and beliefs that constituted the active, living culture of childhood.'* (Ball, 1985 p 47).

Adults have the cognitive images which will allow them to envision highly participatory schools, even if they do not believe they work in one, but the issue of children assessing their own participation was a significant design problem. For many pupils high levels of participation will be hypothetical A further problem was identifying the resources that could to used to stimulate children's responses about participation.. Hart's (1997) classification of levels of children's participation provided a very useful analytical tool to compare children's and adult responses but the difficult question was how were children to envision participation, where were their images to originate from? As Sanger et al (1997) point out group inteviews can pose problems.

*'For much of the age range we were interested in, children find it difficult to think and interact at a propositional level. That is, the more abstract the discussion, the less it means anything to them. .... In*

*order to persuade children to reflect upon their experiences, interviews need to be embedded in more concrete realities.'* (Sanger et al, p 191)

How where we to make the concept of participation seem concrete when for many pupils this was not their reality? This is also the most difficult research area because it requires an understanding of those parts of the world which are central to children' construction of knowledge, but to which adults are not privy (Ball, 1985).

Key
➨ Action research loop

| Area | Objectives | Target | Instrument | Researchers |
|---|---|---|---|---|
| 1 | Conceptions of EE, environmental policy and nature of INSET delivery and needs. | Headteacher / environmental studies or EE coordinator | Questionnaire | University staff. |
| 2 | Examinations of the school's self evaluation report. | Headteacher and selected teachers | To be ascertained. | School academic staff. |
|  | ⬇ |  |  |  |
| 3 | Surveys of the physical environment of the school and their grounds. | Precise focus to be selected by the consortium of schools. | Survey design by consortium. | Pupil teachers, support staff, parents. |
|  | ⬇ |  |  |  |
| 4 | Interviews with teachers, support staff & parents about the school's environment and culture. | Headteacher, selected teachers, support staff & parents. | Questionnaires & semi-structured interviews. | University staff. |
|  | ⬇ |  |  |  |
| 5 | Interviews with pupils about their degree of participation in school actions & decision making. | Small groups of pupils from across the school age range. | Questions, discussions using video & pictorial stimuli. | University staff initially then teachers & other interested parties. |

The solution we arrived at was to use a semiotic approach, partly because children learn how to read images from an early age (Sanger et al., 1997). Before the group interviews with pupils start they are shown a video clip of children learning in highly participatory primary school (OECD, 1994). During the interviews a line drawings showing exemplary EE practice was used. Children were asked to compare their own experiences with these visual stimuli.

The integration of these five areas clearly results in an eclectic research design which should produce thick description:

*'This comes from 'thick description' ..... which in contrast to straightforward description of facts, 'gives the context of an experience, and reveals the experience as a process' (Denzin, 1994, p. 505)*

The final aim of the research is to train school staff as action researchers who will subsequently monitor the changes associated with the implementation of the SEEPS Project. Action research will also result in locally derived knowledge which can be used as a major support for teachers' grounded theories.(Wals and Ablas, 1997). Currently action research features mainly in external courses which teachers pursue largely for career reasons, it is not a strong feature of the internal monitoring and self evaluation of schools (Edwards,1996). If educational improvement is to be achieved through research this has to be done by teachers. External experts do not know the whole story of the organisational culture of schools, they can only know a small part of it; teachers, support staff and pupils know much more. Action research in schools by schools should reveal this broader and deeper knowledge and so give greater fidelity and verisimilitude to the research.

*'If schools move towards a more dynamic culture of teaching and learning, action research will become less dependent on these external structures but will more and more become a necessary correlate of what teachers and students want to do.'* (Posch, 1996, p 68).

## Conclusion.

*'All of this area is ripe for investigation , as are matters like school ethos (dominated hitherto by mainly quantitative approaches - ...), classroom climate and atmosphere, the aesthetics of teaching, and the teacher's self. We have hardly begun to understand these subjects, though anybody who has been involved in teaching knows that they are crucial to educational advance. The omission has been due mainly to lack of an appropriate methodology.'* (Woods, 1996, p 56)

It is our hope that the research approach outlined here will make a contribution to the development of a more appropriate methodology which will help to measure the degree to which EfS assists in changing *'the attitudes and behaviours of people as both consumers and citizens.'*

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# EcoSchool: An ESD Approach: A curriculum and lifestyle program for Australian schools

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## Overview

From 1994 - 1997, the Australian Association for Environmental Education (AAEE) received substantial funds from the federal Department of Employment Education and Training and other federal bodies to develop and implement professional development programs for teachers across Australia in environmental education . The initiative was a result of a unique attempt by all states and territories to develop a national set of outcomes-based curriculum guidelines.

EcoSchool: An ESD Approach is one of seven programs developed this way by AAEE. EcoSchool aims to change behaviours towards those of a conserver, rather than a consumer, society. EcoSchool uses whole school approaches to tackle lifestyles and curricula from reception - year 10. This paper documents the process, the product and the promulgation of the EcoSchool concept

## The Context

In 1993/4 an ambitious attempt by all states was made to develop and promulgate a common set of outcomes-based curriculum guidelines for all curriculum areas from reception to year 12. These are now referred to as the Statements and Profiles for Australian Schools. Eight curriculum areas were collaboratively 'designed' and existing subjects were expected to fit within these eight areas. Environmental Education (ee), a conceptual area in which teachers had had little training and for which employers had shown little real enthusiasm, was seen to fit across all eight areas with content explicitly stated within Science, Technology, Health and P.E.and Studies of Society & Environment (SOSE). The National Professional Development Program (NPDP) from 1994 -96 was a federally funded, three year teacher professional development program based on the Statements & Profiles, as they have come to be called, and costing AUD 60 million. It was highly regarded by the teaching profession because they felt a sense of ownership, but it was abandoned by the Liberal /National coalition government as soon as it came to power in March 1997. The NPDP was unique in several aspects, the most important of which was its direct funding to professional associations, such as AAEE. Another was the three way partnerships between professional associations, universities, and employing authorities. The most significant however was its national focus.

## The Association

In competition with other associations, universities and employing authorities, AAEE bid for and received AUD 150 000 p.a. for the three years of the NPDP and approximately $50,000 p.a. from other sources, mostly federal. This allowed it to set up an office, employ an executive officer, develop and deliver seven professional development programs to some 1 900 teachers across Australia. Initially the coordinators of the seven programs delivered workshops across the country but in January 1996 AAEE trained another sixteen people to expand the delivery of some of the programs into regional areas of Australia. Three core and four specific programs were developed and teachers were encouraged to do at least one core and two specific programs over the 3 years.

Six of the seven programs were accredited by Universities across Australia. Each course required 100 hours of work by the teachers; contact hours varied from 16-40 hours, the rest of the time being allocated to reading and the development, trial and evaluation of teaching units and programs. EcoSchool, the last program of the seven to be developed, was not accreditable by Universities because of its whole school approach and long term nature.

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**Why EcoSchool?**

Students in the next century will need to know how to create a civilisation that runs on sunlight, conserves energy, preserves biodiversity, protects soils and forests, develops sustainable local economies and restores the damage inflicted on the Earth. In order to achieve such ecological education we need to transform our schools and universities.
*From Schools For The Twenty-First Century by Professor David Orr. Resurgence No. 160*

The architecture of many of the newer schools in Australia, and in South Australia in particular, reflect current attitudes of our consumer society and show scant regard for resources such as energy and water. This in the driest state in the driest continent! The redevelopment of school grounds is perhaps the easiest step towards providing daily reminders of pathways to ESD. The retro-fitting of school buildings is the next. However the biggest obstacle to progress towards ESD in South Australia is the collective mindset of the education employers, particularly the government one. A vision of schools leading society by example is urgently needed. and new schools must certainly demonstrate the transformation David Orr is calling for.

"For a long time the problem has been seen to be "out there", but many now recognise that each individual has to be responsible for the future of our planet. Educators believe that schools can and should help to change community attitudes and behaviours. The development of curricula and practices in this document are part of their contribution to that change."
Sue Coad, John Smith in Foreword to EcoSchool: An ESD Approach.

**EcoSchools**

EcoSchool: An ESD Approach, came about as a result of discussions over the increasing number of publications being developed in various states of Australia in the areas of waste and water management and the absence of the equivalent for energy (which had seen sporadic development in the late '80's and early '90's). Little inservice had accompanied these resources whose relevance to existing curricula was not explicit. Global and sometimes even national perspectives, were missing and the cost of printing for small markets was increasing.The Statements and Profiles for Australian Schools and the subsequent NPDP, provided vehicles for the national development of the concepts into the program EcoSchool : An ESD Approach ; and this has now been inserviced in parts of the Northern Territory, Queensland and South Australia and has received interest from people in Japan, U.K. and now, South Africa.

NB Eco-School (sic) is also a term being used by the OECD in one of its Environmental Schools Initiatives programs and a number of Australian schools have been invited to join that Eco-Schools Project. Criteria for being invited to join are not yet delineated EcoSchool, an ESD Approach.

This program began in 1995 as a whole school approach requiring a commitment by principals, staffs and communities to ensure that changes to curricula and lifestyles resulted in an ethos of conservation. The process of change in two trial schools, one primary and one secondary is documented as is an array of curriculum activities linked to the Statements and Profiles and focused on the conservation of energy, water and materials. A companion volume, "Energy in Profile: Bands ABC", suggests ways to plan a comprehensive energy education program. Lifestyle changes are documented to encourage others and show how, for example, to reduse enegy wastage -a potential win-win situation where the school is allocated funds to pay it's energy bills, because it can save up to AUD 3 -6 000 and help with global warming too!
During the selection, development and trial of the EcoSchool program in the two S.A. schools.we sought

- two enthusiastic coordinators with people management and curriculum writing skills
- two supportive principals
- two schools that had potential to succeed but who were not heavily involved in other focal programs
- money to support the efforts of the school and staff by providing time off classes in which to meet and write.

We developed

- a broadly based, support team from state government departments, industry and education
- a writing team in each school to ensure curriculum representation, and ownership of the concepts and products
- procedures for releasing writers, for keeping the rest of the staff and support staff e.g. caretakers and cleaners, informed, and for trial of the ideas and inservicing of the two school's staffs.

Along the way the coordinators, Grace Murphy and Cliff Rothenburg and the teams, in conjunction with Sue Coad, curriculum officer for the Education Department and myself, assisted the schools with

- negotiating and implementing changes to operating and lifestyle procedures such as minimising and recycling paper, plastics, cans and glass; reducing water consumption in toilets, basins and on ovals and reducing energy consumption, particularly through monitoring of lights. These were not always easy to implement as some people were unwilling, or slow to change their behaviours.
- ensuring that students and parents understood the changes, and where possible were involved in them
- periodically talking to staff meetings to report on progress and running 1-2 hour workshops to update staff information and methodologies and ensure broad ownership, particularly of curricula changes.

N.B.The proposed move by the secondary school into a middle school organisation for years 8 and 9 was fortuitous. It meant that their EcoSchool writing team, representing four curriculum areas, was preparing the way for real integration of the curriculum. The exemplars in the book are examples of such integration.

- raising other grant monies for a bank of solar cells and a solar hot water system for each school. These were connected to just one section of each school and the solar cells linked into the mains electricity supply via a "green-grid" inverter, with the unused electricity going elsewhere in the school or into the community. Students monitor inputs and outputs to check energy savings, via meters and/or via computers as the data is stored and can be downloaded.

## The Results

The process took nearly two years to complete because it had to fit in with other priorities of the schools. Waiting on actions from government departments also delayed the original timeline. The outcomes however were well worth it as the following suggest:

- reduction in electricity consumption of approximately 20% (savings of AUD 1 500-3 000 p.a.)
- reduction in use of paper
- increased amount of recycling by the schools and their communities
- reduction in water use on garden, ovals and toilets (Highbury)
- building a solar car to compete in the World Solar Car Challenge - Darwin to Adelaide in 1999 (Seaton)
- staff each with a defined role to do with EcoSchool activities (Highbury) : many teachers in S.A. attended a series of five workshops to find out about the concept
- interstate and overseas inquiries and quite a few visitors
- students eagerly told other students about their EcoSchool project at a statewide Youth Forum

## Evaluation

Mawson Graduate Centre students evaluated the program about two thirds of the way through using four main strands

- textual analysis of the booklet EcoSchool: An ESD Approach,
- evaluation of students' impressions, perceptions and responses,
- evaluation of staffs' impressions, perceptions and responses,
- examination of the overall consequences for the school.

Their findings were as follows

> " When asked whether they normally turned lights off in an empty room two thirds of Highbury students said they did while one third did not. The proportions were almost reversed in the case of Seaton. Three quarters of Highbury students objected to air conditioners being left on in empty rooms compared with just over half of Seaton students. Asked if they tried to encourage their respective families to save energy, 85% of Highbury students said they did, compared to just over half of Seaton students."

> " One major problem which Highbury experienced was the attitudes and behaviours of their cleaners. It proved difficult to convince them that energy and water should be saved. They tended to leave lights on in classrooms in which they have finished and be profligate in water use."

> " The documentation of the project focuses only on the school as a place to learn things environmental. Almost nothing is said about how environmental thinking will spread beyond the school to families and the local area"

From The EcoSchool Project: An ESD Approach. An evaluation and critique by Mawson Graduate Centre for Environmental Studies; University of Adelaide.

A follow-up evaluation would be most useful.

**Conclusion**

The following is taken from the project's evaluation.

> " The EcoSchool project has clearly achieved many things, resulting in the development of some useful curricular materials, provided useful motivation for a number of teachers and undoubtedly resulted in some modest gains for the environment including reduced energy use, possibly some other resource usage decline and a little gain in recycling. Many manufacturers target their advertising and promotion at young people and schools. Computer manufacturers and other technology companies are particularly keen to get their products into schools. There are some dangers in encouraging this uncritically, but in the area of photovoltaics, solar power utilisation and recycling technologies there is surely room for the encouragement of companies to target educational institutions including schools. The fact that schools benefit - as does of course the community and the environment - is a plus. One of the problems with solar technology is the absence of a volume market to reduce costs. Provide that market, which Education Departments could, and the unit costs might fall. Students, exposed to the benefits of such technology from an early age will be willing and enthusiastic protagonists in later life."

The conclusions from the evaluation were taken on board in the inservicing of S.A. teachers earlier this year but it is too early to see results from this.

EcoSchool as a concept has great potential to help schools evaluate the values and behaviours that they promote both implicitly and explicitly - values such as caring for the planet and for future generations and behaviours such as consuming and conserving resources. A sound curriculum base appears to be an essential component for ultimate success in reducing resource use and for promoting sustainable lifestyles. However, in the context of Australian schools most of which were built with little regard to teaching or demonstrating ecological sustainability, and with regard to the pressures on an aging teaching profession, it is essential that changes of the magnitude of EcoSchool are tackled by whole staffs with support from their communities.

# Philosophical, epistemological, doctrinal and structural basis for an internatonal environmental education curriculum

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## Abstract

Environmental educators are fully aware of a need for an International Environmental Education Curriculum ( IEEC) . Such a curriculum meets the theme of the most symbolic and used slogans in E.E., "think globally and act locally" . This slogan refers to the need for students and the public in general to develop an understanding of the global context whereby their actions make sense.

The establishment of a philosophical, epistemological , doctrinal and structural basis, is needed for the development of an IEEC.

This paper highlights a philosophical foundation, an epistemological model, a doctrine, and structural organization, as determiners for an IEEC. The features of the IEEC are described in line of the systems model for curriculum development .

## Introduction :

In " Globalization as a Challenge to Human Learning" , Scheunpflug (1996) recognizes that globalization has become "a challenge for human thought and thus also for learning" (p.7) , he also feels that "it is an important task for educational theory to concern itself with the consequences of globalization" (p.7). The global challenges are described in three criteria, the first of which is the frighteningly huge burden of problems facing mankind, most of them are related to environment, i.e. exploding resource consumption, global population explosion, pollution and destruction of the natural environment ( Scheunpflug, 1996 ) .

Orr 1996) in his viewpoint about educating for the Environment, reaches similar conclusions , concerning the challenge for education. He contends that the ecological crisis is a crisis of education, because the disordering of ecological systems " reflects a prior disorder in the thought , perception, imagination, intellectual priorities, and loyalities in the industrial mind" (Orr,1996, p.7).

In a recent argument, Subbarini 1997a) supported the notion that the environmental crisis is a crisis of environmental education (Fig1) this argument is anchored on the definition of the environmental crisis and on the major stages of the development of environmental education in its modern and ancient history.

The environmental crisis is defined in terms of the decline in habitability of the Earth which is evaluated in terms of the degree of violations of the three laws of ecology that organize the structure of Nature and maintain the natural balance . These laws are "interdependence of all forms of life" , "stability of ecosystems due to diversity and complexity" and "finite resources". Consequently the environmental crisis is manipulated in relation to natural state of the laws of nature , by considering the concept of conservation against wastefulness which leads to the eventual destruction of the environment (Rugomayo, 1993) .

The conservation - destruction influence of the natural state of the laws of nature, is incongruent with the fundamental problem of scale of human enterprise which is identified by Ehrlich and Ehrlich (1994) as the main cause of environmental problems leading for the environmental crisis .

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The problem of scale is "embodied in the I = PAT equation : the scale of the human impact (I) on our environment is the product of population size (P) , consumption per person, which has a measure of affluence (A), and a measure of the damage done by the technologies (T) selected to supply each unit of affluence" (Ehrlich and Ehrlich, 1994, P. xiii) .

Historically, the environmental ethics ( the ultimate goal of environmental education ) in the pre-industrial era, which people have nurtured them from their religions and cultures, inside and out side the formal educational system, controlled their impact on environment and maintained a sound relationship between them and their environment (Yaziz,1985, Subbarini and Al-sakkaf, 1996) .

The pre-industrial environmental tradition or ethic is mostly biocentric or ecocentric, which is the moral accountability of the effects of human actions upon both the non-human level of being and non-living component of nature, irrespective of their indirect effects upon human welfare (Yaziz, 1985 , UNESCO, 1991, Subbarini and Al-Sakkaf, 1996) . However, the global industrial culture which has prevailed for the last two centuries, pushed and continue to push for endless economic growth and development , without attending to laws of nature or the natural balance and sustainability of natural resources . This path in industrial growth societies led to the mandate of the anthropocentric environmental ethic which gives attention and respect to man and his well-being irrespect of destruction to natural resources (Subbarini and Al-Sakkaf , 1996) .

The anthropocentrism - ecocentrism dichotomy led to philosophical split between environmentalists in the modern industrial culture (1960Æs, and 1970Æs ) and two environmental movements emerged , i.e. the shallow ecology and the deep ecology movements or doctrines. The "shallow ecology"movement is an anthropocentric technocratic environmental movement concerned primarily with pollution, resource depletion, and the health and affluence of people in the developed countries, while the " deep ecology" movement is an ecocentric long range environmental movement that rejects the man - in - environment image, and emphasizes the harmony or equilibrium between man and nature (Naess, 1995) .

Although the"deep ecology" movement has shaped the environmental debate among leading activists and policy makers , but the "shallow ecology" movement was rather powerful and more influential movement , mainly because the "deep ecology" was thought as portraying humans as being an alien presence in the earth (Sessions , 1995) .

E.E. in its modern history was born amid controversy among environmentalists in the UN Conference on the Human Environment , held in Stockholm, Sweden in 1972. The Stockholm Conference called for the development of environmental education as one of the most critical elements of an all-out attack on the world environment crisis United Nations,1972) . Such a recognition of the Stockholm conference of the importance and the need for E.E. in environmental conservation and protection, put it in front of challenges that should be met .But E.E. was essentially mandated with a difficult task, and found it-self in crisis.

The crisis of E.E. has characterized it from the very beginning of its declaration . Recommendation (96) of the Stockholm Declaration in response of which E.E. was called for, was flexible, wide, and ambiguous, in terms of philosophy, goals, content, means of implementation, and evaluation of the outcome of teaching activities ; besides that the target group was wide, varied, and changeable. The campaign launched for developing and implementing programmes , at both formal and non-formal levels, was guided by flexible principles developed and endorsed at Tblisi in 1977 .

Environmentalists and environmental educators are aware of the nature and dimension of the crisis of E.E. (Orr, 1996, Subbarini, 1997b) . Some of them highlight philosophical , epistemological and doctrinal dimensions while others highlight structural dimensions of the crisis arising from the holistic nature of the environment, and the complexity of environmental issues .

A third group of environmentalists and environmental educators emphasize actional dimensions for the crisis imposed by economic, educational and social systems.

However, the future of E.E. is not gloomy, because the dimensions of its crisis are well defined, (Fig2) and active efforts are conducted at global regional , and national levels to confront the challenge of the need for definition and enhancement of a new goal for E.E. directed to achieving environmentally sound and sustainable development at global level (Atchia, 1995) .

The following discussion is shedding light on the efforts taken to deferminers for a new E.E. to meet environmental challenges for the present and the future, the emphasis will be given for formal education, and more attention will be directed for development of an International Environmental Education Curriculum ( IEEC ) for higher education .

Determiners for an IEEC :-

" Our Common Future" of the World Commission on Environment and Development is the most noteworthy report of the century . The report called for taking protection and development together in what it defined as sustainable development development that meets the needs of present without compromising the ability of future generations to meet their own needs) (World Commission on Environment and Development, 1987) .

The World CommissionÆs definition of sustainability, have a remarkable influence on E.E. , the goal of which was changed to become Sustainable Development Education (Atchia, 1995) . This change was called for in Agenda-21 of the Rio Declaration, of the United Nations Conference on Environment and Development (UNCED) .

The remarkable advantage of the Rio Declaration for E.E. was resembled by the establishment of an educational niche and legacy for E.E. The legacy encouraged environmental educators to propose that all education is environmental education (Orr, 1990) .

E.E. of the 1990 and of the next century rests on a solid philosophical foundation and well defined doctrine , which guide and determine the formulation and implementation of environmental education programmes. The philosophical foundation of E.E. is based on the recognition of the Rio Declaration that all human beings are entitled to a healthy and productive life in harmony with nature ; and a doctrine defined for E.E. emphasizes that man is a distinct part of nature and has a unique position among other living and non-living components of nature , but that this relationship should be one of stewardship and not tyranny ( environmental ethic of the stewardship type) (Subbarini, 1997b) .

The philosophical foundation and doctrine which are adopted as determiners for E.E. at national , regional, and international levels, are solidly anchored on the pre-industrial culture , with due regard to the evolving global civilization, which supports the symbolic and slogan used in E.E. " think globally and act locally " .

In light of the determiners of E.E. philosophical foundation and doctrine) , its programmes are designed to foster and nurture the growth of environmental literacy throughout the human life span. This kind of literacy meets the economic and development goals nationally and globally, because the environmentally literate citizen is able to understand, appreciate and enjoy the world , to make choices for personal affairs, to contribute for his local environments, and nationÆs political and economic well-being , and to effectively care for planet and work to improve it .

In light of the scope and meaning of environmental literacy, inter- disciplinary curriculum in E.E. is suggested for all parts of the world as a way for thinking and acting for global environmental conservation (Polunin,1997) . The curriculum is characterized by the following features .

- an epistemological model is used in the design of the curriculum . The model is composed of three interacting systems, i.e the environment natural and built ) , environmental problems and environmental protection. Each of the three systems is composed of three interacting sub-systems, the environment is composed of biosphere, technosphere and socio-sphere (1) the environment problems system, covers the population, the depletion of resources and pollution problems, the protection system is composed of environmental legislation, scientific and technological countermeasures, and education .

- the content of the curriculum is presented in line with the three laws of nature , that organize the structure of nature and maintain the natural the content of the curriculum is presented in line with the three laws of nature, that organize the structure of nature and maintain the natural.

(1) The three spheres might be embraced in one term, the Homosphere (Polunin, 1997).

(2) balance . The manipulation of the content in relation to the laws of nature helps in dealing with the holistic and complex nature of environment , and permits the smooth and clear pesentation of environmental issues and problems, which are myriad, complex in nature and ever-changing.

(3) a variety of teaching strategies are exposed to meet the complexity of environment and environmental problems in one side, and to cope with individual differences among learners in the other side. The major teaching strategies exposed are : experience in natural and man-made environment , conducting research and practical studies, role playing, study of environmental issues and problems, comics and environmental cartooning, problem solving , teaching environmental values, and active participation in environmental activities .

(4) evaluation methods and techniques are discussed as means for getting feed - back about the effectiveness of the implementation of environmental education curriculum, i.e. to evaluate whether the intended outcomes of the curriculum have been achieved, in relation to needs and objecties of the curriculum . The methods and techniques focus on the achievement of cognitive, psychomotor and emotional dimensions of the goal of environmental education . The three dimensions of the goal of E.E. embody, the characteristics of the environmentally literate person . The environmentally literate person :

communicates and applies major ecological concepts and principles .
understands how man's activities influence the environment from an ecological perspective demonstrates the ability to identify and investigate environmental issues and alternative solutions, and assimilates environmental values needed for rational and responsible use of environmental resources

The IEEC is developed in line of the Meyer ( 1995) approach of the systems model to curriculum design and development ( Fig3). The input is composed of the philosophical foundation and doctrine adopted in- ternationally as determiners for E.E., the input includes also the epistemological model used in the design of the curriculum. The processing is meant the selection and sequencing of the content in line with the three laws of Nature and learning experiences (strategies and methods) The output of the IEEC is meant the outcomes of the curriculum in terms of achieved objectives ( global environmental ethic ) . The feedback loop is to evaluate whether the intended outcomes ( output ) have been achieved in relation to the inputs .

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# Environmental Education In Tourism - A Comparison Between Canada and Japan

***by David J. Telfer and Atsuko Hashimoto***

## Abstract

With an increase in concern over the state of the planet, environmental education has come to the forefront. Traditionally left to such departments as geography, resource management, and environmental sciences, environmental education has been slow to enter the field of tourism education. However, as the turn of the century approaches, international tourism is forecasted to be the most important sector in world trade (Witt et. al.1995) resulting in impacts in all countries of the world. Initially functioning as an instrument for development, researchers have begun to question the benefits of tourism. While environmental impacts and sustainable tourism development have dominated recent tourism research this trend has received minimal coverage in the tourism curriculum. The purpose of this paper is to examine the level of environmental education in tourism programmes in universities in Canada and Japan. Course descriptions were collected and analysed. There are few formal environmental education components adopted in tourism education programmes. For the most part, the environment is compartmentalized in a small section of the course dealing with impacts, E.I.A. or sustainable development separate from social, economic and political impacts of tourism. With tourism emerging as one of the largest interrelated global industries there is a need to increase the level of holistic environmental education within tourism programmes incorporating social, political and economic impacts along with the environment.

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## Introduction

With an increase in concern over the state of the planet, environmental education has come to the forefront. Traditionally left to such departments as geography, resource management, and environmental sciences, environmental education has been slow to enter the field of tourism education. However, as the turn of the century approaches, international tourism is forecasted to be the most important sector in world trade (Witt et. al.1995) resulting in impacts in all countries of the world. Initially functioning as an instrument for development, researchers have begun to question the benefits of tourism. While environmental impacts and sustainable tourism development have dominated recent tourism research this trend has received minimal coverage in the tourism curriculum. "The 1990 Tourism Policy Forum ... identified concern for the environment as the number one issue to be addressed by the tourism sector in the coming decade. A look at today's curriculum in the tourism and hospitality field reveals an increasing but still minor recognition of this reality." (Ritchie 1992, 258).

## Tourism Education and The Environment

While tourism is a relatively recent topic for universities, studies have shown that tourism education has grown rapidly around the world in the late 1980s and into the 1990s. In Australia the number of tourism programmes has grown from 10 in 1989 to 18 in 1995 (Wells 1995) and in the UK, the number of institutions offering tourism courses has increased from 15 in 1991/92 to 43 in 1995/96 (Middleton 1997).

Tourism education has taken a number of different forms. Ritchie (1995) outlined the major models of tourism/hospitality education which have been utilized in various countries around the world which are outlined below. **The Hotel School** has as its main priority to prepare individuals to become managers of hotel and resort properties. The structure of the Hotel School programmes revolves around operational aspects of the hotel properties (Food and Beverage and Front Desk Operation) along with courses related to the running of the hotel (Sales and Marketing). **The General Management with a Tourism Focus Model** has evolved more recently and is an attempt to provide a broader educational experience. The core of the programme is a general management education including liberal arts, languages and mathematics. In addition to taking a number of courses related to the tourism/hospitality industry, a number of programmes offer a practical work term. The final model for tourism education is known as **The Liberal Arts Programme with a Tourism Focus**. This model includes a wide range of programme types including discipline-based programmes with a tourism component. The most commonly related fields are geography, economics, or sociology. A second category are the Recreation or Leisure Studies programmes which can include a significant tourism component. These programmes tend to have an academic focus as opposed to an industry orientation. The final category in this model are multidisciplinary Majors in Tourism Studies programmes which are similar to the previous programmes however they have a much stronger industry focus.

As Shepherd and Cooper (1995) indicate, tourism is a diverse and complex activity and a variety of stakeholders need to be recognized in the development of the tourism education. A number of authors have put forward models and suggestions to increase the environmental content in tourism education courses. In examining possible future directions in tourism education, Ritchie (1992) advocated a greater emphasis on cross-listing courses so that students would have access to the environmental oriented courses which would compliment their primary orientation. Gunn (1992) argues that there is a need for multi-disciplinary tourism education which would include a focus on the environment. Henry and Jackson (1995) developed a framework which integrates the concept of sustainable tourism into the tourism education curriculum under the categories of concepts/philosophies, policy orientations and finally skills/competencies. Ritchie (1995) also put forward a hybrid programme in tourism studies which combines the Hotel School Model along with an emphasis on management training. Within this hybrid programme Ritchie developed several thematic areas including the environment which includes the following three courses 1) Ecology and Human Affairs, 2) Economics of the Environment, and 3) Renewable Resources & the Natural Environment.

Still others have examined initiatives of inter-universities organizations attempts to develop educational resources to examine the issues and approaches to sustainable tourism management (Bramwell 1996). The ATTT (Association of Tourism Teachers and Trainers) which is part of the Tourism Society provides a forum for discussing the future of tourism education and training. Initiatives of the European organization ATLAS (European Association for Tourism and Leisure Educators) have as part of their mandate to develop a common curriculum which includes environmental protection as one component. In addition to efforts from the universities, WTO (World Tourism Organization 1996) has developed manuals for tourism education with curriculum and course design which include an environmental component. With tourism emerging as one of the largest interrelated global industries there is a need to increase the level of holistic environmental education within tourism programmes incorporating social, political and economic impacts along with the environment.

### Purpose

The purpose of this paper is to examine the level of environmental education in tourism programmes in universities in Canada and Japan, two countries which generate large numbers of international tourists and have relatively few distinct tourism programmes at the university level. In contrast to the many vocational schools in Japan and Canada where practical training is offered, university tourism education has received comparatively less attention however, this trend has started to be reversed in the late 1980s and into the 1990s. Tourism education in Japan is relatively new with the first institution being established in 1967 and is more management oriented. In 1998 there are only 10 universities offering a four year degree programme in tourism. Many of the tourism programmes were developed during the 1990s. Tourism education is found in 17 universities in Canada in a diverse range of departments and the topic is covered in a single course to an entire tourism degree programme. In order to evaluate the level of connection to the environment, course descriptions were collected from universities in Japan and Canada and analysed. The programmes were evaluated on a number of categories including: model of programme, faculty and department, name of course, year offered and whether there was an environmental component in the course or whether environmental electives could be taken in conjunction with the tourism courses.

Before the analysis of the university programmes, it is necessary to clarify a few terms. Programme refers to the entire degree programme which the students are studying towards. At the other end of the spectrum are the single courses or modules such as "Tourism Planning" or "The Geography of Tourism" which students study for one to two semesters and receive credit towards their degree. It is recognized that European and North American institutions interchange the terms "course" and "module" to represent the same entity. For the purposes of this paper, the term "course" will be used to refer to a single subject study for one or two semesters.

### Methodology

The analysis of the material was based on evidence from course descriptions from universities calendars and the Internet. The findings below examine tourism education in 7 Japanese universities and 17 Canadian universities. In the Canadian universities sampled, 5 universities offered tourism in more than one department. Attempts were made to cover all of the universities providing tourism education however, these data do not necessarily represent an exhaustive list. In both countries, tourism courses may be taught which were not detected in the sampling. In Canada, university course calendars and web sites were consulted looking for the key words of tourism, hospitality, recreation, leisure, geography, management and business. In Japan, a list of universities was obtained from the Ministry of Transport - Tourism section which maintains a list of universities offering tourism. In addition an updated list was provided by Rikkyo University and university and college guides were consulted. Connection to the environment was measured by the terminology used in the descriptions of the courses. Courses were selected based on terms including environmental impacts, impact studies, environmental issues, ecology, ecosystem, conservation/preservation, natural resources, resource management, physical/natural environment, physical/natural development, and sustainable (tourism) development. However, even when these terms were not explicitly expressed, introduction courses are included as it is customary to include at least one section on environmental impacts of tourism. It is recognized some tourism courses will be taught and include a study of the environment without mentioning them in the course description or title and as a result are not included in this study. Graduate studies and the Tourism Research Centres established at some of the Canadian universities are excluded at this time however these programmes will be examined in future research.

### Findings

As outlined above, tourism programmes can take a variety of different forms. The purpose of this section will be to evaluate the differences between countries as well as between various types of programmes. Initially this section will look at the profile of tourism programmes in Japan and Canada. These programmes are examined for the extent to which they have an environmental focus or students are able to take additional environmental courses to compliment their tourism studies.

The analysis of the data found that tourism programmes are located in many different faculties as indicated in Table 1. Some tourism courses at Canadian universities were found within an independent "school" such the School of Hotel and Food Administration at University of Guelph. Depending upon a student's area of concentration, some institutions granted a BA (Faculty of Arts) or a BSc (Faculty of Science). In Japan, tourism tends to be found in a business setting while in Canada, tourism is found in a diverse range of faculties ranging from business to recreation.

**Table 1**
**Known Faculties in which Tourism Programmes are Located**

| Japan | Canada |
|---|---|
| Social Science (2) | (Applied) Arts and/or Science (8) |
| Commerce (2) | General Studies (1) |
| Economics (1) | Social Science (3) |
| International Studies (1) | Business (1) |
| Country Studies (1) | Physical Education and Recreation (2) |
| | Natural Resource and Environmental Studies (2) |
| | Applied Health Science (1) |
| | Management (1) |

**the number of faculties is shown in brackets*

Table 2 further summarises the data by identifying the departments in which tourism programmes are located. Similar to the previous table, tourism is offered in a wide range of departments in Canada. In Japan the departments centre more on the business and the commerce side of the topic while Canadian departments reflect a greater trend towards the liberal arts studies especially geography.

**Table 2**
**Department or School where Tourism Programmes are Offered**

| Japan | Canada |
|---|---|
| Tourism (1) | Geography / Geography & Environmental Studies (10) |
| Tourism Economics (2) | Leisure Studies/Recreation Studies/Leisure & Recreation Studies (5) |
| Tourism Industry (2) | Tourism & Hospitality Management (3) |
| International Tourism (1) | Commerce (1) |
| Import/Export Trade (1) | Leisure, Tourism and Society (1) |
| | Resource Recreation & Tourism (1) |
| | Outdoor Recreation, Parks & Tourism (1) |
| | Hotel and Food Administration (1) |

**the number of departments is shown in brackets*

In order to evaluate the different models of tourism programmes, Ritchie's (1995) typology described earlier, will be utilized. Table 3 clearly reflects Table 2: all Japanese universities fall into the Business/Mangement Model and the majority of Canadian Universities into Liberal Arts Model. Hotel School Model at the university levels is found more often in North America such as Cornell University (USA) and University of Guelph (Canada). However, in Japan, the Hotel School Model is considered to be vocational (training) education and tends to be found in the institutions like Tokyo YMCA Hotel School, which are equivalent to Community Colleges in Canada. As mentioned earlier, 5 out of 17 Canadian sample universities offer tourism related courses in two or three different departments which often fall into different models identified by Ritchie.

**Table 3**
**Models of Tourism Programmes** (by departments)

| | Japan | Canada |
|---|---|---|

| | | |
|---|---|---|
| Hotel School Model | 0 | 3 |
| Business/Management Model | 7 | 3 |
| Liberal Arts Model | 0 | 16 |

Below in Table 4 is a selected list of the tourism courses taught in both countries which have some connection to the environment. In order to avoid duplication, the similar titles are stated in the first column of the Table.

In terms of number, it was found that in a Liberal Arts Model such as geography or recreation, only a small number of courses are offered on tourism. Both in Japanese and Canadian universities, the majority of the tourism courses touch on environmental issues but are not dedicated to the concept of environmental education. Two notable exceptions are the University of Northern British Columbia which offers a programme dedicated to outdoor recreation and tourism and account for several of the entries in Table 4. Ryerson also offers an innovative course entitled "Sustainable Tourism Development". Another marked difference is that several of the courses offered in Canada tend to be centred on resource management and the outdoors while Japanese universities focus more on the physical development of tourism sites. Courses which are shared by both countries tend to be introductory in nature or deal with planning and development.

**Table 4**
**Selected List of Environment Related Tourism Courses**

| Common titles for Japan & Canada | Japan | Canada |
|---|---|---|
| Introduction to /Foundation of Tourism | Destination Regional Studies (international) | Conservation in Wildland an |
| Principles of Tourism | Destination Regional Studies (domestic) | Environmental Issues in Out Planning |
| Tourism Destination/Site Planning | International Tourism Geography | Geography of Tourism and R |
| Tourism Geography | International Tourism Resources | International Tourism |
| Tourism Planning and/or Development | Resort Development | Introduction to Resource Bas |
| | Resort Development Law | People in Natural Areas |
| | Resort Studies | Recreation Enterprises and T |
| | Tourism Law/Legislation | Resource Planning for Touri |
| | Tourism Policy | Sustainable Tourism Develo |

In addition, the format of the degree programmes were examined to determine if students are able to take electives with an environmental focus to supplement their tourism studies. Although most of the Japanese universities follow a Business/Management Model, many non-tourism courses directly related to environmental studies are offered as core or electives (Table 5). Moreover, most of the Japanese tourism programmes require credits from courses such as natural science or geography in the first two years. This provides students an opportunity to take additional course(s) related to environmental studies.

In Canadian universities, those students studying liberal arts programmes such as geography must take environmental courses in all years of their programme. In these types of programmes, it was found that most tourism courses are not offered until year three. Those students in the Liberal Arts Model not directly connected to geography may take options from a wide variety of courses. The Recreation Programme at the University of Calgary recommends the following options related to the environment: "Ecology and Human Affairs", "Environmental Problems and Resource Management" and " Renewable Resources and the Natural Environment". Those studying in the Hotel School Model or the Business/Management Model take tourism courses from the beginning of their degree programme and have the option to take electives which in part may be connected to the environment. These options tended to be from the areas of arts and science.

**Table 5**
**Japanese Business/Management Model - Non-Tourism Environmental Electives**

| | |
|---|---|
| Core | Ecology (1) |
| Preferred Option | Environmental Planning (1) |
| | Environmental Law (1) |
| | Environmental Psychology (1) |
| Option | Science Elective (Non-Specified) (5) |
| | Environmental Conservation (2) |
| | Environmental Studies (2) |
| | Anthropology (2) |
| | Natural Geography (1) |
| | Ecology (1) |
| | Environmental Law (1) |
| | Environmental Sociology (1) |

**the number of departments which offer these courses is shown in brackets*

It is, nonetheless important to remember that in a non-exclusive tourism programme, many of the tourism courses are introductory in nature and the environment is considered along with many other topics. It is also true that tourism programmes at one Japanese university and one Canadian university do not offer any courses related to or even touch the environmental issues in tourism. While there are few courses totally related to the environment, it is expected that the number will increase as this is a dominant area in research and will move more fully into the curriculum.

## Conclusion

As indicated by Ritchie in 1992, the tourism curriculum has a minor although increasing recognition of the environment and the findings of this study still confirm his comment with a few exceptions. There are still few formal environmental education components adopted in tourism education programmes. For the most part, the environment is compartmentalized in a small section of the course dealing with impacts, E.I.A. or sustainable development separate from social, economic and political impacts of tourism. Ritchie (1995) outlined three models of tourism programmes. In Japan the Business/Management Model was the primary model while in Canada tourism is found to a greater extent in the Liberal Arts Model. Reflecting this trend, in Canada the faculties and departments where tourism is located cover much broader range than in Japan. This limited model in Japanese universities could be ascribed to the fact that the tourism programmes have been developed in the past few years after following a couple of successful cases in Europe and North America. The Liberal Arts Model in Canada is dominated by geography and often students are not able to take individual tourism courses until the third year of their degree.

In non-tourism degrees, many of the tourism courses were found to be of an introductory nature and were not focused on the environment however, all programmes offer students the option to take electives which may contain an environmental focus. It must be noted that as these courses are options, there is the possibility that students in a concentration area such as recreation or commerce may only get a very preliminary understanding the impacts tourism has on the environment.

However, on the brighter side of the findings, it is evident that many universities in both countries recognize the significance of the global environmental issues in connection to tourism and are encouraging more courses focused on the natural environment. Particularly in Canada, where pristine natural environment is one of the most important assets, the area of resource management receives special attention. As a most encouraging example of the recent improvement, University of Northern British Columbia's Resource Recreation and Tourism programme (founded 1992) revolves around the sound management and utilization of natural resources through these activities. With tourism emerging as one of the largest interrelated global industries, there is an urgent need to persuade existing universities and the institutions which plan to launch tourism programmes, the significance of holistic environmental education within tourism programmes, and to encourage them to include these environmental courses within tourism programmes.

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# Environmental education inThailand: Reproduction and reformation

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## ABSTRACT

This study was conducted to improve the pedagogy of teaching and learning activities of the Environmental Science for Teachers course based on some of the principles of action research. Documentary study, surveys, a participatory workshop, and action research were employed in this study. Participant observation, interviewing, journal writing, questionnaires, photographs, and videotaping were employed in data collection for monitoring the action phase of the research. In the reflection phase of the research, the data were analysed and reported both qualitatively and quantitatively, with the emphasis was placed on qualitative approach. Illuminative, formative, and summative evaluation were used to investigate the effectiveness of a workshop on group process and the reformed Environmental Science for Teachers course. Both open-ended and close-ended questionnaires were used at the end of the implementation of the reformed course. The results indicated that through group process and action research the researcher and participants acquired skills in problem-solving and collaborative work. In particular, the participants possessed self-esteem, self-respect, and a sense of belonging. They showed a keen interest in the protection and conservation of natural resources. The findings of this reformed course were not limited to classroom teaching and learning activities but the students in the program learned about process of personal development and group change.

## Introduction

Our planet is confronted with very serious environmental problems such as global warming, deforestation, destruction of the ozone layer, pollution, toxic waste, acid rain, depletion of energy resources, and endangered plant and animal life (Nation, 1991; Asano, 1991; Huckle, 1988). Our natural resources are being depleted and environmental degradation is increasing because of our unsustainable patterns of production, uncontrolled population growth, and social and economic inequality (UNESCO-UNEP, 1994). These problems will cause more and more strain on the earth's natural resources and habitats (Asano, 1991).

Therefore those who plan for the social and economic development should be aware of the urgent need for sustainable development. Sustainable development requires prudent management of human and natural resources, especially those resources that are non-renewable. This can be achieved by consuming less, and by wise using of natural resources (Viravaidya, 1994) so that production and supply can be balanced. Sustainable development should be taught at all levels in our educational systems. It is an importance that every person develops an informed awareness of the limits of our natural resources. If we do not do so, we will destroy ourselves and our society (Huckle, 1991; Fien & Trainer, 1993). At present, everyone knows and acknowledges environmental problems but only a few people truly understand and are aware of an importance of the environment. It is difficult and time consuming to persuade other people to appreciate the value and worth of the environment. To achieve this, new attitudes, skills, knowledge, awareness, and behaviours towards the environments are needed. Therefore, environmental education may be an appropriate way to help man face his environmental problems (UNESCO-UNEP, 1994; Fien & Trainer, 1993).

Education in, about, and for the environment are three approaches to environmental education (Fien, 1988). Education in and about the environment is intended to develop knowledge, awareness, attitudes, and skills. Education for the environment is intended to enhance values, ethics, problem-solving, and action (Fien, 1988; Spork, 1992). Teaching environmental education should introduce the concepts of one world and interdependence, as well as teach the learners to respect their environment and that of other living forms, the importance of taking good care of one's health,

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to develop a sense of personal responsibility and a commitment to society, and to be aware of the consequence of actions and decisions on the environment. It is education for the environment which seems to contribute most to the general well-being of environment (Sonneborn, 1994).

In this study, the researcher emphasised teaching strategies to foster collaborative work, critical thinking, humanistic values, conserving skills, attitudes, and desirable behaviour towards the environment with his teacher education students in the Faculty of Education at Khon Kaen University.

**Statement of the problem**

Teaching and learning in environmental education in Thailand still has gaps between cognitive and affective domains, between theory and practice, and between knowledge and desirable behaviours (Sinlarat, 1993; Nutalai, 1993). Having taught the Environmental Science for Teachers course for eighteen years, the researcher was confronted with difficulties in applying theory (knowledge) into students' practice, applying educational principles into teaching, and encouraging students to actively participate in teaching and learning activities. The researcher realised that these difficulties were serious problems so he was challenged to consider how instructors could improve their skills in teaching to improve the quality of learning. The researcher and some instructors had tried to overcome those difficulties but most of the time they had failed. Students studied and remembered the course contents for an examination only. The researcher began to question how to encourage students to participate in teaching and learning activities in environmental education and how learning could be improved. In response to these questions, the preliminary studies were carried out from April 28 to June 28 in 1995. The researcher surveyed opinions about the Environmental Science for Teachers course (present situation, problems and expectations) from former students who had taken the course and some colleagues. The researcher also interviewed school principals, teachers, and students in the northeast secondary schools about present situation and teaching and learning of environmental education in schools.

The results indicated that lecturing was the primary medium for teaching environmental education in schools and universities levels and therefore, it was difficult to foster awareness and concern for the environment in the students. The method of teaching was mostly didactic. School teachers and university lecturers tended to be authoritarian and students tended to be passive learners. Students learned by hart for the cognitive domain neglected the affective and psychomotor domains. Students did not pay much attention to the common interest of the class and lacked skills in teamwork.

In addition, it was the researcher's belief that teaching and learning in the Environmental Science for Teachers course has not been able to create awareness and concern for the environment. The course focused too much on content and students were assumed to be able to apply knowledge into practice by themselves. The students in the course were passive learners. It is true that they learned a lot about the environment but their actions toward the environment contradicted their knowledge and attitudes. In this circumstance we could not claim that the goals of environmental education could be achieved or promoted. Therefore, in order to meet the goals of environmental education, the learners should actively participate in teaching and learning activities. Thus, the following question for the study was formulated:

How can the researcher improve his pedagogy of teaching in the Environmental Science for Teachers course ?

In response to the above question, the researcher's preliminary study centred on opinions and perceptions of the related people. In addition, a review of the literature on environmental education and educational research was conducted to explore suitable methods of improving the quality of student learning. The researcher developed a strategy to enhance teamwork skills, and develop self-esteem and as self-respect. This strategy involved a participatory workshop on group process. In addition, the researcher also developed a strategy of using problem-solving according to the Four Noble Truths (Chabudbuntarik, 1992) of Buddhism to encourage the students to analyse their experience and identify relationship between concepts and practice.

## Aims of the study

This study aimed to improve the quality of learning in the Environmental Science for Teachers course by changing the pedagogy of teaching and learning so that the learners became more active than passive involvement.

## Significance of the study

When learning by problem-solving, the students have to use critical thinking and other skills in the cognitive, psychomotor, and affective domains to gain a better understanding of events encountered in the teaching and learning environment. There is no doubt that the students' active participation in classroom activities plays an important role in determining their ability to work and learn effectively. This study is important because it provides personal development and learning experience for the learners so that they can be active participants in the classroom. This study was designed to help learners develop responsibility, to encourage them to be responsive citizens, and to foster a learning processes which require dynamic rather than passive involvement. In addition, the collaborative nature of the study produced suggestions for changing the objectives, contents, process of teaching, and evaluation. The researcher's role in this study was that of a pedagogue and facilitator who led and guided learning activities in the classroom. The researcher provided activities, opportunities, experience, materials, and encouragement to the students.

## Research methodology

After the reconnaissance work of the situation of environmental education in school and situation of the Environmental Science for Teachers course, the researcher conducted a participatory workshop and action research. The participatory workshop on group processes was conducted collaboratively to enhance group understanding. This was achieved through reflective discussion in which participants were encouraged to express their opinions. Some of the principles of action research were used in this study. Action research is concerned with developing situational and practical understanding (Elliott, 1991). This study proceeded through a self-reflective spiral of planning, acting, observing, and reflecting. In conducting educational research, the researcher has to remind himself of the ethical issues and accuracy of the results. It is the ethics of research to avoid bias, to report factual results, and to respect each individual's right in a democratic society (Adelman, 1989). Ethical considerations involved informed consent, the privacy protection, anonymity and confidentiality of participants, and available reports to informants (Spradley, 1979; 1980). In conducting this study, building good relationships with participants was considered important. Being a Thai and having training in personal development helped the researcher develop good rapport through his human relation skills and sincerity.

## Design of the study

The structure of this study was based on the conceptual framework of group processes and action research. This study was divided into four phases. In the first phase, documentary study and a literature review were employed to investigate and understand concepts and theories within a period of four months from October 1994 to February 1995. In the second phase, the preliminary study or reconnaissance work was conducted to formulate and identify the research problems and study design within period of two months from April 28 to June 28, 1995. In the third phase, the field work in Thailand was carried out within a period of seven months from December 9,1995 to July 17,1996. The field work was divided into three steps. In step 1, the researcher conducted a participatory workshop on group process with participants in the Faculty of Education at Khon Kaen University. In step 2, the reformed program was implemented with participants through the four cycles of the action research spiral: planning, acting, observing, and reflecting. In step 3, a follow-up study was conducted to evaluate the effectiveness of the reformed course. This study followed-up with some participants of the Environmental Science for Teachers course who intended to convey some experience gained from participating in this program. In the fourth phase, eighteen months of analysis and writing was completed in Australia and Thailand from August 1996 to December, 1997.

## Participants

Participants in this study were five principals, five teachers, and eight students of the secondary schools in northeastern Thailand, thirty former students who had completed the Environmental Science for Teachers course, seventeen students who enrolled in this course, and six colleagues from the Faculty of Education.

### Techniques for collecting data and monitoring the study

In monitoring the study, the researcher employed various techniques for collecting data such as interviews, participant observations, journal writing, reflective writing, audio and video recordings, assignments, questionnaire, and photographs (Elliott, 1992; Kemmis & McTaggart, 1992). A triangulation was used to ensure that the data were as good as they could be. Triangulation involves collecting data about a situation from the point of view of people occupying different roles and positions within it (Elliott, 1991). The researcher has tried to ensure that the data were as good as it possibly could be by encouraging the following:

- The willingness and commitment of the research team and participants in helping with this study.
- Easy participation in the study (making it easy for participants to contribute data).
- Major concern of the research team for the ethical dimensions.
- Good rapport.
- Use of multiple sources of data.
- Commitment of the research team to the accuracy and trustworthiness of data.

### Techniques for analysing of data

Data was analysed both quantitatively and qualitatively, with the emphasis on qualitative approach. The researcher analysed the data to explore ideas, viewpoints, and issues relevant to the classroom activities. A triangulation technique was used to cross-reference a number of participants' perceptions of an event (Grundy & Kemmis, 1981). To ensure accuracy and validity, journal writing reports were verified and released by participants.

In analysing qualitative data, an interpretive technique was used to explore the perspectives of the participants The interpretive approach tries to reconstruct "what it is like" from the participants' perspectives (Jeans, 1997). In this approach, the researcher engages a process of critical and reflective investigation by looking at the data from every angle and considering it thoughtfully. Although the qualitative data seem not to be important in action research, the researcher would like to develop a better understanding of the phenomenon, therefore the t-tests were used to investigate the significance of differences between the means of students' behaviours before and after participating in the workshop on group process and the reformed course.

### Results

#### *Outcomes of participants in group process*

At the end of a workshop on group process, all participants were asked to anonymously write to reflect their feelings and opinions toward the workshop. The following reflections were the participants' opinions toward the activities.

The students agreed that:

- the group process activities were very useful for students both for their present and future work.
- the activities gave participants an opportunity to share and express their ideas freely.
- they had a chance to study themselves and their friends. This helped them to know themselves and their friends better. Some of the activities made them think about self-value and other-value and led them to have more self- respect and respect for others.
- they learned more about giving and taking in different situations.
- the students learned a communication technique that is very important when working with people with different personalities.
- they could apply these experiences in their future work.
- they gained more valuable experience than they expected for a weekend workshop.

However, one student suggested that the period of conducting a workshop on group process should not be near the mid-term examination period. The outcome is very positive due to enjoyment of students for their first time experience in participating in a workshop on group process.

The researcher's colleagues agreed that:

- the participants showed good collaboration in doing group process activities.
- the participants were very active and have high responsibility for all activity.
- the participants gained a lot of knowledge, skills, and experience from participating in the workshop on group process, especially self-respect, and teamwork were developed.
- the participants can apply knowledge and techniques gained from the workshop in their daily life and the future work; and
- the participants showed enthusiasm and enjoyed doing activities.

***Outcomes of participants in action research***

Examination of the data, including self evaluation, observations, interviews, and participants' reflection that have been collected during the study indicated that the reformed Environmental Science for Teachers course was effective because of the following reasons:

- the good rapport of colleagues developed with the participants.
- the good collaborative work among participants.
- the competence of participants showed in group discussion.
- the willingness of participants to accept responsibility for promoting awareness and concern for the environment when they practise professional teaching.
- the enjoyment of participants in the reformed Environmental Science for Teachers course.
- the improvement of participants' presentations.
- the participants' skills and spirit in teamwork, as well as a sense of belonging.
- the participants' understanding of content and pedagogy as indicated in their reflections.

## Conclusions

The results of this study showed that teaching and learning in the reformed Environmental Science for Teachers course improved participants' teamwork skills and behaviours. The principles of action research provided opportunities for participants to express their own opinions while the activities were going on so that the activities could be improved. The participants were very satisfied with this teaching and learning strategy. They developed and increased levels of self-esteem, self-respect, other-respect, and decision-making during the workshop on group process and during the reformed course. Self-esteem and self-respect helped the participants to develop a clearer sense of their own self-worth: physically, intellectually, emotionally, and spiritually. It was evident that this strategy of teaching help to foster desirable characteristics of world environmental citizenship. Therefore, it is recommenced that teaching and learning using some of the principles of action research or participatory action research is an appropriate strategy of teaching and learning for environmental education (especially education for the environment). Furthermore, the Four Noble Truths that was used as a framework to analyse the cause and effect is also valuable in the Buddhist's context.

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# The relevance of environmental education to the OBE curriculum 2005 in South African schools

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## INTRODUCTION

There is no gain saying the fact that the education system inherited from the apartheid era needs transformation in a bid to correct the imbalances of the past. As we enter the new millennium, South Africans will be required to do conceptual work which demands critical thinking, fair judgement, flexibility, innovation and personal commitment rather than mere routine.

South Africa will fare poorly in global competitiveness in the next century if the development of human resources is not prioritised at all levels within the education and training system, In this light, it behoves all education stakeholders to ensure that education and training in South African meet the challenges of the 21st century. This is the rationale for an OBE-Orientated curriculum in our school system. In March 1997, the Ministry of Education launched Curriculum 2005 for general education and training. This marks an end to the education system of the past and introduces a new organisational framework for teaching and learning in South African schools. In terms of this new curriculum, teachers and learners are expected to effect changes in teaching and learning in all learning areas. This includes environmental education.

The White Paper on Education and Training (1995) states: "Environmental education involving an interdisciplinary, integrated and active approach to learning, must be a vital element of all levels and programmes of the education and training system, in order to create environmentally literate and active citizens and ensure that all South Africans, present and future, enjoy a decent quality of like through the sustainable utilisation of resources".

Through the Environmental Education Policy Initiative(EEPI), the South African government has made significant attempts to include environmental issues in the specific outcomes of the OBE Curriculum 2005.

## PURPOSE OF STUDY

The purpose of this paper is to illustrate to what extent environmental education will be relevant to Curriculum 2005. It also aims to demonstrate how environmental education may be taught in all the eight learning areas by resorting to a cross-curricular thematic-outcomes methodology in South African schools.

In order to delimit the scope of this paper and also eschew a possible confusion of terms and concepts, we have defined a number of key-words as used in context.

I

## DEFINITION OF TERMS

### 1. CURRICULUM.

**Collins Cobuild English Dictionary** (1995: 401), defines the term 'curriculum' as all the different courses of study that are taught in a school, college or university. A curriculum is everything planned by educators which will help develop the learner. A good curriculum produces thinking and creative learners.

### 2.. CURRICULUM FRAMEWORK

A curriculum framework is a set of principles and guidelines which provide both a philosophical base and an organisational structure for curriculum development initiatives at all levels, be they national, provincial, community or school-based. A curriculum framework serves as a strategic intervention designed to facilitate and guide the development of a transformed education and training system in a practical and sustainable way

## 3. NATIONAL QUALIFICATIONS FRAMEWORK(NQE)

The National Qualifications Framework(NQF) is one that provides learning opportunities for learners regardless of age, circumstances, gender and level of education. It also ensures training on an on-going basis. The NQF is a bridge between education and training. It recognises prior knowledge acquired both formally and informally.

## 4. LEARNING PROGRAMME

A learning programme is a set of learning and teaching activities and ways of assessing a learner's competence. A learning programme consists of courses or units of learning(learning material combined with a methodology), by which learners can achieve agreed-upon learning outcomes.

## 5. OUTCOMES

Outcomes are the results of learning. processes and refer to knowledge, skills, attitudes and values within a particular context. Learners are required to demonstrate that they understand and can apply the desired outcomes within an outcomes-based education system.

## 6. OUTCOMES-BASED EDUCATION

An outcomes-based education (OBE) system is that which focuses not only on what you learn but also on how you learn. In other words, the process of learning becomes just as important as the learning itself In OBE, teachers and learners focus attention on the results expected at the end of each learning process and the processes that lead learners to achieve these results(i.e. outcomes). OBE is a shift from content-based to learner-based education.

## 7. CRITICAL OUTCOMES

The full name of this category of outcomes is critical Cross-field outcomes. The South African Qualifications Authority(SAQA) defines seven types of critical outcomes which specify the essential abilities that learners must strive to acquire. Critical outcomes are generic, cross-curricular and cross-cultural outcomes

## 8. SPECIFIC OUTCOMES

Specific outcomes are context-specific. They describe the competence which learners must demonstrate in particular areas of beaming. Specific outcomes serve as the basis for an assessment of the laerner's progress. They are contextually demonstrable knowledge, skills and values that reflect critical cross-field outcomes.

## 9. LEARNING AREA OUTCOMES

Learning area outcomes are related to ' a specific beaming area. They are the general skills, abilities and values that a laerner will be expected to demonstrate in a given beaming area.

## 10. LEARNING AREA

The term "Learning area" describes a group of related knowledge, skills, values and attitudes in an OBE-Orientated curriculum. There are eight beaming. areas in OBE.

## 11. UNIT STANDARD

A unit standard states the specific outcomes that need to be achieved to make up a credit on the National Qualifications Framework,

## 1.2. CREDIT

This term refers to the recognition of a laerner's success in achieving a unit standard. Credits may be accumulated until conditions have been met for awarding a qualification.

## 13. ASSESSMENT

The term 'assessment' describes a method of measuring a laerner's progress. Evaluation is a crucial aspect of OBE. The facilitator must review how the specific outcomes were achieved, which learning areas were utilised and how successful the assessment activities were. Assessment is a way of measuring a laerner's competence.

## 14. COMPETENCE

Competence refers to a laerner's ability to combine the use of skills, information and understanding relevant to a particular beaming situation, and the essential outcomes at a required level of performance.

## 15. LEARNING PATHWAY

A learning pathway is a plan of beaming that a laerner needs to follow 'n order to progress in a chosen career.

## 16. LEVEL

A level is a position on the National Qualifications Framework where unit standards are registered and qualifications are awarded to those who have completed the necessary combination of unit standards.

## PHILOSOPHICAL FOUNDATIONS OF CURRICULUM 2005

Curriculum 2005 changes the focus of the South African education and training system from content-based to outcomes-based. It introduces lifelong beaming, ensures that high quality education is accessible to all, irrespective of age, gender, colour, creed or language. All South Africans desire a prosperous and democratic country free of discrimination, in short, a country capable of competing internationally. All these aspirations are central to Curriculum 2005.

The new curriculum prescribes a new way of looking at learners. Learners will no longer perceived as empty vessels into which the teacher must pour knowledge. Learners will longer be seen as competitors but collaborators. They are neither stupid nor clever. Every laerner is unique and has the potential to learn. Curriculum 2005 aims at equipping all learn with the knowledge, competencies and orientations needed for success in life after they h left school or completed training. It integrates education and training, rejects a rigid divisi between academic and applied knowledge, theory and practice as well as knowledge and skill The curriculum equally fosters beaming which encompasses a culture of human rights, multi-lingualism and multi-culturalism as well as sensitively to the values of reconciliation nation-building. It ensures quality education for all South Africans.

Curriculum 2005 recommends a new way of looking at teachers as well. Teachers are longer fountains of all knowledge. They are facilitators, assisting learners to improve nurturing and supporting them. Facilitators are expected to working a team in order to guide learning, not transmit knowledge. Their major task is to enable learners to communicate, sol problems, work in a team, acquire self-confidence and life skills.

Over and above, curriculum 2005 advocates a new way of looking at assessment. Assessment shall be an integral part of learning, not a separate component of the learning process. It is continuous and developmental process, It tests not only knowledge but also skills an attitudes. It helps learners to succeed. It is not designed to judge learners. The teacher assesses both the work completed and the learner's ability to communicate what has been leamt.

In a nutshell, assessment measures a learner's understanding of issues, shows how a learner uses facts and demonstrates a laerner's thinking and communication skills.

The foregoing are the basic principles of the new curriculum, the driving force of which is OBE. A number o tenets underpin OBE as outlined below by Spady & Marshall (1991).

## BASIC TENETS OF OUTCOMES-BASED EDUCATION

It is pertinent to underscore the point that outcomes-based beaming moves away from the notion that learning involves spending a specified length of time in a classroom in order to receive credits or a qualification. As Spady & Marchall (1991: 67) observe OBE is a shift from teacher inputs(i.e. what teachers do) to learner outcomes (i.e. what learners know and can do). It is anchored on the following premises: -

### (i) LEARNER-CENTREDNESS

OBE puts a high premium on the learner. It recognises and builds on their knowledge and experience. It also responds to their needs. Different learning styles and rate learning need to be acknowledged and accommodated both in the learning situation in the attainment of qualifications. The ways in which different cultural values lifestyles affect the construction of knowledge should also be acknowledged incorporated in the development and implementation of learning programmes.

### (ii) RELEVANCE

Learning programmes should be relevant and appropriate to current and anticipate future needs of the individual and society, commerce and industry. Evidence has sho that economic growth is dependent on a well-educated citizenry, equipped with t competence and skills required for economic advancement at any given point in time.

### iii) INTEGRATION

OBE recommends an integration between education and training. An integrated approach to education and training implies a view of learning that rejects a rigid divisi between academic and applied knowledge, theory and practice, knowledge and skill head and hands.

### (iv) DIFFERENTIATION. REDRESS AND LEARNER SUPPORT

Learning programmes should be tailored to meet the needs of all learners, including those who are disabled in one way or another, to strive towards the attainment of similar learning outcomes. Differences in learners' interests and ability should challenge educators to explore a host of alternative instructional methods and approaches. This implies that learners must be afforded the opportunity to cope with demanding performance standards at their own pace rather than at the pace of the majority o learners in a classroom.

### (v) CRITICAL AND CREATIVE THINKING

In OBE, learning programmes are geared towards promoting learners' ability to think logically, analytically and holistically. This includes an acknowledgement of the provisional, contested and changing nature of knowledge and of the need to balance independent, individualised thinking with social responsibility as well as the ability function as part of a group, community or society.

### (vi) FLEXIBILITY

Although learning programmes for OBE education and training should adhere t coherent framework of principles and lead to the attainment of national standards qualifications, the means for reaching these ends must be determined by provider in accordance with the needs of their learners.

### (vii) PROGRESSION

Learners should be able to progress to higher levels of achievement by mastering prescribed learning outcomes rather than through age or course. In brief, learning programmes should facilitate progression from one class, phase or learning, outcome another from any starting point in the education and training system. Prior knowledge (acquired informally or by work experience) would have to be assessed and credited.

### (viii) CREDIBILITY

In order for a country to be internationally competitive, its education and training system(s) would have to be compatible with those in the rest of the world. This implies quality assurance. Quality assurance hinges on three cardinal pillars: -

(a). Promoting a quality culture to engender an ethos of praise, acceptance of criticism and mutual support;
(b). Quality control which involves an audit of the nature and standard of service delivery;
(c). Ongoing quality improvement where the total quality system, including. the process, should be evaluated from time to time.

In sum, OBE beaming focuses on the achievement of clearly defined outcomes, rather than teacher input in terms of syllabus content. The NQF defines OBE outcomes in terms of balanced and integrated national standards which demand the holistic development of competence, and encompass knowledge, skills and attitudes. These outcomes constitute what may be termed the scope of OBE.

## SCOPE OF OUTCOMES-BASED EDUCATION

The outcomes of education refer to the intent of an educational process. Once outcomes have been defined, they can then influence other components of the curriculum. Outcomes define the scope and structure of the content through which learners develop the knowledge, skills and values defined by OBE. The instructional method is designed in such a way that learning activities. achieve a number of outcomes...

The integration of knowledge is a crucial aspect of OBE. OBE rejects the dichotomy between theory and practice. It identifies two types of outcomes(critical and specific) as defined above and also eight learning areas as analysed briefly below: -

### (i). NATURAL SCIENCES

This learning area englobes physical, life and earth sciences. The physical(material) universe is studied and a variety of methods are used to develop scientific knowledge.

### (ii). HUMAN AND SOCIAL SCIENCES

This learning area helps learners make sound judgements in a culturally diverse, democratic society. This involves the study of interhuman relationships as well as the relationship between people and their environment. It develops distinctive skills and critical awareness of social and environmental patterns, processes and events.

### (iii). ARTS AND CULTURE

The Arts & Culture learning area embraces the material, intellectual, spiritual and emotional aspects of society. Culture encompasses the expression of thoughts through arts.

### (iv). MATHEMATICAL LITERACY. MATHEMATICS AND MATHEMATICAL SCIENCES

his learning area comprises three domains, namely knowledge of patterns, problem-solving and logical thinking. Through a set of symbols and language, the laerner's understanding of the world is expressed, developed and contested.

### (v). ECONOMIC AND MANAGEMENT SCIENCES

Economics and management sciences prepare learners to understand the essence reconstruction, development and economic growth for the future. This learning fosters active participation by equipping learners with knowledge and an understanding of economics, management skills and wealth creation.

### (vi). LANGUAGE, LITERACY AND COMMUNICATION

Language and communication are crucial to human development and lifelong learning. This learning area gives learners access to information and knowledge. Language enables the laerner to think logically, critically and creatively participation in society.

## (vii). LIFE ORIENTATION

Life orientation is an Integral part of education. It deals with inculcating self-esteem survival skills in the learner. It promotes healthy lifestyles based on a human rights culture.

## (vii) TECHNOLOGY

The technology learning area enables learners to recognise problems and solve them designing, developing and evaluating products and processes. We all need access technological knowledge in order to cope with challenges in a technologic fast-moving world.

From the foregoing, it is self-evident that OBE channels teaching and learning towards relevant outcomes within clearly defined teaming areas. This applies to environmental education which forms an integral part of the human and social sciences learning area.

## PRINCIPLES AND OBJECTIVES OF ENVIRONMENTAL EDUCATION

Before offering a framework that would enable the incorporation of environmental education into programmes of beaming within Curriculum 2005, it is desirable to review the te 'environmental education', its principles and objectives.

The term 'environment' is understood to mean not only the biophysical world but also its social, economic and political dimensions, resting upon a base of biophysical life support systems. Environmental issues are complex and multi-faceted. These involve risks and problems which engender an unhealthy environment. Various environmental problems arise within ecosystems. These include: scarcity and over-utilisation of natural resources, erosion of agricultural soils, waste production, desertification, air pollution, the irreversible degradation and despoliation of land, etc. Ecological degradation gives rise to poor health, poverty, overcrowding and loss of developmental potential. To clarify and resolve these crises, all works of life must engage in environmental education.

The term 'environmtal education' has been defined in various ways by different schools of thought, We have retained the following as our working definition in this paper. Environmental education is education that creates positive attitudes towards the environment. It is a process during which values are discovered and concepts explained in order to develop skills and attitudes pertaining to an appreciation of the relationship between man, his culture and his biophysical environment, Environmental education also includes the practice of decision-making as well as the formulation of a personal/societal code of conduct on matters relating to environmental health and quality of life.

In a bid to provide a basic framework for environmental education at all levels, two international conferences, namely the Tbilisi Conference (UNESCO, 1980) and the Moscow Conference(1988) laid down twelve principles:

- Environmental education views the environment in its totality. It is important to pay attention to the ethical, social, cultural and economic dimensions of the environment;
- Environmental education follows an interdisciplinary approach. It relates to every subject and discipline known to man;
- Environmental education imparts knowledge, skills and also clarifies values. It makes people sensitive to environmental issues.
- Environmental education views environmtal concerns from a local, national and international perspective. This holistic nature of EE must be underscored in all beaming programmes;
- Environmental education concentrates on current and potential situations and at the same time maintains an historical link between socioeconomic circumstances, the environment and the past;
- Environmental education helps learners to discover the causes and effects of environmental problems;
- Environmental education gives learners the opportunity to plan their own learning experiences and take vital decisions. It makes it possible for learners to share in the planning of their own beaming, programmes;

  Environmental education is an on going (i.e. continuous) process. It is not limited to formal education but should be incorporated into every walk of life;

Environmental education stresses the need for cooperation in solving environmental problems. All sectors of the community are expected to pool efforts in the strive to combat environmental crises;

- Environmental education underlines the complexity of environmental problems and makes people realise the need for critical cognitive skills, and Environmental education employs a wide range of approaches in teaching and learning.

It ensues from the above that EE aims to endow learners with the ability to observe and interpret environmental phenomena and to measure the relative healthiness of the environment and to take appropriate action to maintain, restore or improve the state of ecosystems.
It is clear from the above discussion that the cross-curricular and interdisciplinary nature of EE makes it an integral part of OBE. In other words, it is feasible to integrate EE into an OBE learning programme because both share a number of parallels.

## PARALLELS BETWEEN OUTCOME-BASED EDUCATION AND ENVIRONMENTAL EDUCATION

A cursory look at OBE and EE leaves one with the impression that these are two distinct and disparate domains. However, the truth of the matter is that OBE and EE share a number of parallels or as common areas as illustrated below.

OBE and EE are both outcomes-based. In both approaches, there are critical outcomes, the most important of which is the learner's ability to collect, analyse, organise and critically evaluate information. Equally important is the learner's ability to use science and technology effectively, showing responsibility towards the environment and the health of others.

More importantly, in both OBE and EE beaming, the learner is expected to demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation. In theory, both OBE and EE focus on relevance to the present and future needs of individuals and society as a whole (Tbilisi, 1977. Smyth, 1995; Tilbury, 1995. NQF, 1996).

Furthermore, OBE and EE adopt a holistic approach to curriculum development and emphasise the importance of integration and cross-curricular teaching (Tbilisi, 1977. Spady, 11991; Tilbury, 1995; NQF, 1996).

Over and above, OBE and EE are values-orientated and are concerned with the integration of knowledge, skills and values(Tilbury, 1995, Tbilisi, 1977. NQF, 1996). Both approaches are learner-centred and encourage active beaming on the part of learners, by involving them in real learner-centred and simulated action. They also emphasise the importance of lifelong learning. Critical and creative thinking is equally a critical aspect of both approaches.

Team work is central to EE and OBE where beaming is facilitated through group work. Working in a group makes learners start to feel positive about themselves. Team work stimulates participation and communication. To ensure that there is full participation in the team, the facilitator ensures that there is feedback from the group. In doing, so, she puts himself / herself in a good posture to assess all learners. The importance of evaluation in both OBE and EE cannot be overemphasised. Peer assessment is particularly important in OBE and EE teaching and beaming contexts. Learners are made to assess one another, form an opinion of their group's performance compared to the outcomes they should have reached. This involvement of learners in assessment expedites the learning process.

Self -assessment is also central to OBE and EE. Learners are asked to evaluate themselves against given outcomes. This affords them the opportunity to discover their strengths and limitations. In sum, OBE/EE assessment focuses mainly on what learners know and are capable of doing. It is integral to teaching and beaming, focuses on skill application and involves a wide range of methods. OBE/EE assessment concern itself with understanding, success and cooperation. Both are learner-centred, results-oriented approaches based on the belief that all individuals have the potential to learn.

These are only a few of the many similarities between OBE and EE that constitute the rationale for incorporating EE into the learning programmes of the OBE Curriculum 2005

## RATIONALE FOR INCORPORATING ENVIRONMENTAL EDUCATION INTO CURRICULUM 2005 OBE LEARNING PROGRAMMES

One of the major reasons that justify the integration of EE into OBE learning programmes is the fact that the thrust of EE is the achievement of outcomes, not the memorisation of facts. Environmental Education is a process of active learning that requires an assessment of demonstrated learning in relation to specific outcomes, Work samples, questionnaires, observation, testing, collecting portfolios and mind mapping are some assessment strategies common to both EE and OBE.

In addition, with so many of the specific outcomes of OBE indicating the need for learners to be actively engaged in learning about their environment, in their environment and for their environment, the logic behind the incorporation of EE in the learning programmes of Curriculum 2005 brooks no interrogation. Heila Lotz(1997) suggests that learners will have to be given opportunities for head-on practical and interactive beaming experiences, Environmental education processes are particularly suited to providing many of these learning opportunities. Discovery activities, problem-solving activities, observation activities and activities which practically apply scientific and technological skills, all offer opportunities for beaming which are learner-centred and active.

Curriculum 2005 defines eight beaming areas. Combinations of specific outcomes from these beaming areas form the new learning programmes. The specific outcomes in the learning programmes have been grouped together around phase organisers. One of such phase organisers is 'environment', making environment a cross-curricular discipline in all phases of the General Education and Training band. If environmental education is viewed as a process through which we may empower ourselves and future generations to respond to environmental concerns in ways that might foster change towards sustainable community life in a healthy environment, it would be difficult to isolate environmental education as a separate discipline in a school curriculum. Developing EE processes across the curriculum is not only desirable but imperative given that EE is concerned with all aspects of life. An integrated study of human / environmental interrelationships would draw on specific outcomes from a range of learning areas, making EE a cross-curricular process.

Cross-curricular teaching lends itself well to EE because it is a problem-based discipline. The cross-curricular methodology enables learners to:

- Acquire, communicate and investigate worthwhile knowledge in depth;
- Integrate and enrich learning processes;
- Create relationships among various sources of knowledge;
- Make choices, interact, collaborate and cooperate,,
- Apply what they learn in a meaningful and real world context;
- Participate and learn together;
- Formally and informally assess understanding and application of what is learned.

In brief, the cross-curricular nature of EE makes it part and parcel of OBE. Thus, EE can be taught in the formal school system by having recourse to a theme-outcomes methodology.

## TOWARDS A THEMATIC-OUTCOMES METHODOLOGY FOR TEACHING ENVIRONMENTAL EDUCATION IN THE FORMAL SCHOOL SYSTEM

There are three possible approaches for incorporating environmental education into the formal education system in South African Schools. These include: -

(a). A thematic-outcomes approach;
(b). An outcomes-thematic approach;
(c). An issues-based/outcomes approach.

For the purpose of this paper , we have adopted the thematic-outcomes methodology analysed in a discussion document entitled: **Enabling Environmental Education As A Cross-Curricular Concern in Outcomes-Based Learning Programme,** to illustrate how EE could be taught across the curriculum in all the eight areas of learning that constitute OBE.

This approach presents units of work through an integrated thematic approach to learning. Through a clustering of specific outcomes and related areas of content into themes of work, programmes of beaming can be developed which: -

(a). Provide learners with sustained sequential beaming experiences rather than fragmented approaches which originate from discipline orientations to learning programme development;
(b). Create logical links between curriculum areas and specific outcomes; and
(c). Enable an in-depth exploration of topics.

This model represents a good option for beaming programmes development, especially if specific outcomes from a group of beaming areas are clustered. While the themes of work present an integrated approach to learning,_clarity on how specific outcomes will be covered through the themes of work must be maintained to ensure balanced programmes of beaming. The following example adopted from Murdoch(1993) and Heck(1995); demonstrates how a range of specific outcomes may be developed for the intermediate phase. This approach gets the learner involved in different kinds of activities relating to the theme.

They key phases in an inquiry-based approach to thematic work would be:

- Planning the theme,
- Investigating and researching into the theme,
- Communicating and interpreting the results of the investigations through different mediums and learning areas.,
- Reflecting on the investigations;
- Taking action resulting from investigations and reflections.

The thematic-outcomes approach shows how cleaners could be actively involved in all phases of the theme and how they could participate in all the above phases of the inquiry-based theme work.

In the theme 'soil' shown in the sample below, the following specific outcomes have been clustered:-

NATURAL SCIENCES

SO 1: Use process skills to investigate phenomena related to natural sciences.
SO3: Apply knowledge and skills to problems in innovative ways.
SO9: Demonstrate an understanding of the interaction between natural sciences and socioeconomic development.

HUMAN AND SOCIAL SCIENCES

SO2: Demonstrate an understanding of patterns of social development.
SO4: Make sound judgements about the development, utilisation and management of resources.
SO5: Critically understand the role of technology in social development.
SO6: Demonstrate an understanding of the interrelationships between society and the natural environment.

ECONOMIC AND MANAGEMENT SCIENCES

SO l: Engage in entrepreneurial activities.
SO8: Evaluate the interrelationships between economic and other environments.

LANGUAGE. LITERACY AND COMMUNICATION

SO5: Learners understand, know and apply language structures and conventions in context.
SO7: Learners use approach communication strategies for specific purposes and situations.

MATHEMATICAL LITERACY, MATHEMATICS AND MATHEMATICAL, SCIENCES

SO6: Use data from various contexts to make informed judgements.

**ARTS AND CULTURE**

SO2: Use the creative process of arts and culture to develop and apply social and interactive skills.

**SAMPLE LEARNING PROGRAMME**
**INTEGRATING SPECIFIC OUTCOMES FROM LEARNING AREAS**
**GRADES 4-6 LEVEL**
**THEME / UNIT OF WORK : SOIL**

| Suggested Studies | Suggested Methods | Outcomes |
|---|---|---|
| INTERPRETATION AND COMMUNICATION<br>Utilise a range of methods and data sources to communicate and interpret investigation data. | Communicate results of soil sample testing on graphs | SO6: Mathematics |
| | Write stories to communicate information gained from the interviews | SO 7: Languages |
| | Make visual representations showing changes in land use over time | SO 2: Arts & Culture |
| | Communicate cultural values associated with land use and land ownership through arts and cultural activities | SO2: Arts & Culture<br>SO 6: Human & Social Sciences |
| | Role play issues of power and control over land and land use in the local area | SO 3: Human & Social Sciences |
| REFLECTION AND EVALUATION<br>Analyse cause and effects of human activity on soil as a resource.<br>Investigate resource management issues relating to soil utilisation | Reflect on how properties of soil influence the use of soil | SO 4: Human & Social Sciences |
| | Reflect on how human activity influences the use of soils | SO 6: Human& Social Sciences |
| | Reflect on sustainable practices which enhance soil quality and reduce soil erosion observed during the theme work. | SO 9: Natural Sciences |
| | Draw conclusions from the observations of life in the soil | |
| | Draw conclusions from investigations into the economic activities related to soil utilization as a resource | SO 6: Economic & Management Sciences |
| TAKING ACTION / PROBLEM SOLVING<br>Practical environmental and social problem solving | Plan and undertake a practical action based project related to the above investigations and reflections for example: | SO 4: Natural Sciences<br>SO 7: Human & Social Sciences |
| | Establish a permaculture garden. | |
| | Develop a soil rehabilitation project (eg. composting). | |
| | Start an entrepreneurship project using soil as a resource. | SO 1: Economic & Management Sciences |
| | Start a project to stop or prevent soil erosion. | |

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In the above approach, strategies for assessment will be linked to the attainment of performance and assessment criteria for the specific outcomes which have been clustered within the theme of work. In the example above, EE has been interested into the theme, and historical studies of environmental chances and impacts of human activity are included.

This methodology illustrates how a range of specific outcomes and learning. areas may be integrated into a thematic unit of work.

Murdoch and Heck recommend that if this approach is to be used in developing a learning programme, care must be taken to ensure that collectively all the themes chosen for a particular phase of study, should cover all the specific outcomes and learning areas adequately,,
so as to enable learners to attain the assessment criteria.

## CONCLUSION

The object of this paper has been to demonstrate the relevance of environmental education to OBE within the framework of Curriculum 2005. To this end, we highlighted some fundamental parallels that link EE to OBE and used a thematic-outcomes approach to show how EE could be taught as a cross-curricular discipline in our schools.

We fervently hope that this modest contribution would serve as a catalyst for more in-depth research that needs to be done on Curriculum 2005.

## ABBREVIATIONS

OBE = OUTCOMES-BASED EDUCATION
SAQA = SOUTH AFRICAN QUALIFICATIONS AUTHORITY
ABET = ADULT BASIC EDUCATION AND TRAINING
CEPD = CENTRE FOR EDUCATION POLICY AND DEVELOPMENT
FETC = FURTHER EDUCATION AND TRAINING CERTIFICATE
RPL = RECOGNITION OF PRIOR LEARNING
GET = GENERAL EDUCATION AND TRAINING
NQF = NATIONAL QUALIFICATIONS FRAMEWORK
HET = HIGHER EDUCATION AND TRAINING
FET = FURTHER EDUCATION AND TRAINING
GETC = GENERAL EDUCATION AND TRAINING CERTIFICATE
ECD = EARLY CHILDHOOD DEVELOPMENT
EE = ENVIRONMENTAL EDUCATION

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## Creating environmental perspectives in a developing community

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'Start a large project -- like saving the planet. It is guaranteed to last a lifetime'
Odyssey - August/September 1994

### INTRODUCTION

Technikon Northern Gauteng is situated about 50km north of Pretoria in the large sprawling community of Soshanguve. The student community which the institution serves is composed of many different backgrounds and language users. Students from middle class city dwellers, squatter camps and far-northern rural areas all seek tertiary training opportunities here. The largest majority of students come from very disadvantaged backgrounds in terms of township and rural schooling opportunities, but also from families who could not provide adequate facilities to stimulate development. Because of the demographic situation of the institution and the fact that universities and technikons in the city have a greater appeal, students who are not accepted on the grounds of scholastic performance into these institutions, try to find entrance at Technikon Northern Gauteng. This institution thus should strive to become a bastion of higher education and be committed to the upliftment of the communities it serves.

The fast-growing population of the surrounding area, the ever-increasing demand on limited resources, pollution through industrial activities, excessive littering and inadquate waste management measures, really brought home the necessity to start a large project, like at least, saving the immediate environment. Consequently, an overseas study tour was undertaken to investigate the possibility of introducing an Environmental Science course with specific emphasis on chemical related aspects in the Department of Chemistry. North America was chosen as the field of investigation because the Americans suffered serious water- and air pollution problems, for which solutions were readily in place. The Environmental Protection Agency (EPA) has been up and running since 1969 and environmental awareness among the people on the street is a widely accepted phenomena. In-depth discussions were thus held with selected internationally recognized authorities in various fields of envrionmental protection and training.

### THE NEED FOR ENVIRONMENTAL AWARENESS AND SCIENCE EDUCATION AND TRAINING AT TECHNIKON NORTHERN GAUTENG

Technikon Northern Gauteng has a major and special commitment to the metropolitan community which it serves. Its first and foremost commitment is to build capacity through the training of students from a disadvantaged background and also the establishment of cooperative programmes within regions of common interest. Furthermore it has the responsibility to make the inhabitants of the area aware of the adverse effects of pollution on the environment. In most urban areas, such as the greater Pretoria metropolis, pollution has already reached unacceptable levels. The situation can only deteriorate and will certianly be aggravated in the following decade, and beyond, through the projected rapid growth of the population and accompanying industrialization. Increased contamination will occur through sanitary, domestic and industrial waste, incomplete combustion of fossil fuels in heating practices in informal settlements and the expected increase in the use of internal combustion engines for transport.

The Department of Chemistry had the foresight to allow the introduction of environmental chemistry as course material in the National Diploma in Analytical Chemistry subject structure in January 1996. At the time of writing four (4) semesters of environmental chemistry II course work and one (1) semester of environmental chemistry III course work have been completed. (Subject structures and semester content can be made available to interested parties). A total number of 110 students have thusfar completed courses in this field.

BEST COPY AVAILABLE

Curriculum 2005 - the new national curriculum for the twenty first century for South Africa was announced in February 1997 by Professor Sibusiso Bengu, Minister of Education. Herein, the establishment of a culture of lifelong learning development has been adopted which is absolutely necessary to meet the needs of the communities. Eight different learning areas have been demarcated, with the Natural Sciences learning area described as the ability 'to manage the resources of the world effectively - people need to understand the universe - both natural and created by people. This learning will equip learners with the ability to understand our natural resources and to manage them effectively'. (Curriculum 2005:14)

The teaching of environmental chemistry have thus far proved to be a perfect vehicle to introduce aspects of environmental awareness and an awakening to responsible care. Furthermore, it is realized that effective environmental management cannot be done from only fragmented knowledge. A paradigm shift towards skills development and a holistic understanding of the interconnectedness of humankind and the environment is necessary to achieve the goals associated with the philosophy of lifelong learning. This can only be achieved through ongoing education.

## STRUCTURE, TEACHING EXPERIENCE AND OUTCOMES OF ENVIRONMENTAL CHEMISTRY AS COURSE MATERIAL

During the investigation period in 1995 as mentioned in the introduction, a number of academic programmes dealing with environmental science and management were in place or in the process of being developed at various South African universities and technikons. Most of these were offered at postgraduate level.

We needed environmental chemistry textbooks on a 'popular' level which would enable us to introduce new terminonology, train chemical aspects of anthropogenic activities and a holistic insight into the interconnectedness of chemistry disciplines and life sciences. Furthermore, a large component of the course material should be dedicated to extensive environmental awareness training.

Very few local publications at the time dealt with the subject matter. The selection of a textbook could only be made from available overseas publications.

The following were chosen:

Buell, P and Girard, J. 1994. *Chemistry An Environmental Perspective*. Prentise Hall Publishers. ISBN 0-13-644659.

Manahan, Stanley E. 1994. *Environmental Chemistry*. 6th Ed. Lewis Publishers.
ISBN 1-56670-088-4. This textbook was used as background reading material and as the main source of material for the advanced course.

The local daily newspapers, magazines like Conserva, Skipper, Huisgenoot, Earthyear etc. the radio and television could supply topical South African information. Young Scientist, Journal for Chemical Education, Nature, The National Geographic Magazine etc. carried articles which elucidated the material which was discussed in the textbook.

The eventual use of an American publication underlined the interrelatedness of processes, people and the global village idea. It was also realised that America was consious of environmental problems and that solutions were sought and in many instances found and applied.

Environmental chemistry was introduced to students in the third semester of their National Diploma in Analytical Chemistry, consisting of four semesters theoretical course work and two semesters in-service training. The advanced environmental chemistry course material was followed by students who attended a fifth semester of theoretical studies in the B Tech degree structure.

See appendix A for course material contents
Study manuals were developed for each course.

Interesting problems and challenges arose in the teaching of a brand new and thus far, completely unknown discipline, some of which I would like to share with you:

- Difficulty of students to think in holistic terms. It was found that even though quite complex chemical reactions were studied in the organic or inorganic chemistry class, most simple reactions eg carbon dioxide as part of the carbon cycle or as product of the burning of fossil fuel could not be understood in context.

- Highly specialized language is necessary to describe the sciences. Terminology explanation becomes a large part of the training process, because the English language might be a second or third language of the learner and the lecturer. Environmental chemistry introduced a whole new set of chemical 'jargon' into the playing field which proved to be problematic when logic thinking and writing skills are expected to explain and interpret chemical and socially related environmental problems.

- Some topics proved to be highly controversial because it could not be related to the traditional disciplines of chemistry and was initially met with a lot of resistance. Scientific ideas about the formation of the Universe has been met with amazement and resistance throughout. It precipitated soul-searching discussions, disbelief and even remarks like 'scientists are the antichrist'. Complaints about the subject not being chemistry, were delivered to the door of the Head of Department.

- Initially students had the idea that this is a pushover subject and that very little time should be needed to study - until the first test!

- On a personal level I felt alienated from most of my colleagues. They either felt threatened or harboured the idea that this subject does not fit the lofty halls of chemistry and is 'easy'.

A philosophy of training environmental awareness with a strong chemistry theme was adopted for the introductory course. The advanced course offering style was based on the chemical aspects of the chosen topics.

The outcomes were fascinating.

- Once the students overcame the initial resistance and a good rapport was established between learners and lecturer, a whole new world of applied chemistry unfolded. The subject therefore has the advantage that it can be used to facilitate the moving away from compartmentalized thinking and force participants to break out of the limitations of fragmented knowledge. The process of holistic thinking and the intuitive understanding of the interconnectedness of all processes can be explored. A rekindling of African spirituality might be possible as well as the sharing of ancestral knowledge with white, westernised Africans!

- Progress through the syllabus brought enthusiasm as students began to realise that their learning material in the textbook could be validated through their daily experience of topical happenings in and around their living environment. Waste separation, waste minimization, use of solar power, water saving techniques, planting of food gardens, indigenous trees and vegetation, could be discussed as possible projects to bring about change and sustain the living environment. Ideas of 'conserve' and 'share' became more acceptable.

- The local campus served the purpose of posing as different ecosystems and could thus be studied and visited quite often. Together with a professional botanist, we endevour to develop a classification system whereby the botanical names, vernacular names, tribal usage and folklore can be recorded. Possible health risks to the community could be appreciated if proper waste management measures were not practised. Many objectives can be set through the study of the local campus and built into 'environment education as a strategy to cultivate love and consiousness for the environment through formal education'.

- Researching waste flows on the local campus and in the surrounding community of Soshanguve have been undertaken as a practical component of environmental chemistry training but also as part of an intra-institutional initiative.

The domestic waste found on campus can be used to teach:

- Fundamental aspects of environmental chemistry such as:
the chemical composition of materials; the chemical manufacturing processes of materials such as glass, polymers, rubber, metals, laboratory chemicals, medical materials and wastes; biodegradeable and non-biodegradable matter and interfacing environmental chemistry and toxicology with examples of possible health risks to members of the community.

- Fundamental aspects of environmental awareness such as:
environmental degradation through non-caring attitudes; aspects of the culture of littering; money wasted on waste; entrepreneurial advantages of recycling, re-use and waste minimization and the building of capacity to influence mindsets and create applicable technology.

The Environmental Education Curriculum Initiative document stresses the empowerment ' .. of communities to act on environmental issues and to promote environmental ethics' and ' international trends of education for sustainable living..' which the waste flows may teach in the terms and concepts understood by developing communities and may therefore form part of the creation of lifelong learning philosophy.

- A waste paper recycling project, which started from humble beginnings, is already a flourishing ENVIROCARE affair supported by four very dedicated members of the cleaning staff.

- Under the auspices of an accomplished Pretoria-based artist, the students were taught the basic skills and simple chemistry of paper production from waste paper.

- A soap-making project was introduced with the objective to train students the chemistry of soap, basic research methodology, the art of operating a production line, budgeting, packaging procedures, handling of customers, and entrepreneurial skills.

- Once yearly, the students are encouraged to stage a student symposium. Most of our students come from very disadvantaged backgrounds and do not have exposure to gatherings of people operative in the science and technology fields. Such an event give them the opportunity to live through the complete cycle of organising, researching topics and reading papers at their own symposium.

- The most appreciated outcome is truly the knowledge of a person's own selfworth. The course material has proved to be a perfect vehicle to touch the hearts and minds of learners. We have tried to instill the idea that one person can make a difference and therefore we must become the stewards of sustainable living environments. Lao Tsu declared 'if you pick up a leaf, the earth moves'. We have used this saying as a guiding light to always be aware of our actions and interconnectedness!

## CONCLUSION AND RECOMMENDATIONS

'Saving the environment will be the next century's biggest challenge' was echoed by all the experts with whom discussions were held and who had a longer history of environmental consiousness than South Africa. Survival might depend on national governments forming partnerships involving scientists and policy makers from governmental agencies, tertiary education institutions, industrial corporations and environmental advocacy groups. National and international networking for the successfull stewardship of our planet is what is truly needed.

For South Africa as a developing country it is clear that an environment-conscious generation must be raised who would be able to become the future stewards of our continent. In order to achieve this, the following issues and goals emerged as particularly important and relevant especially as a result of the past two years teaching environmental chemistry as a 'new' discipline:

- It is recognized that all environmental problems are interrelated and connected to biospheric processes so that an integrated multidisciplinary approach must be followed in order to solve them.

- Environmental literacy must be increased by introducing and encouraging environmental chemistry and environmental science in the structure of general education at all levels, from elementary school through to tertiary training institutions.

- The education and training of professional environmental scientists must become a top priority of the present government.

- The understanding of global issues at a political level must be improved so that due account is taken of them in policy making.

- Local authorities must create their own policies and regulations with the aid of unbiased information supplied to them by competent scientists and policy makers.

- Sanitary and industrial wastes created by urbanizing populations must be controlled by the active participation of the communities themselves. To achieve this extensive awareness programmes should be developed and implemented within the communities.

- Potential re-use of waste and recycling should become joint ventures betweeen local communities and tertiary institutions serving these communities.

- A rediscovery of African spirituality should take place in centers of learning and policy making in order to facilitate the ancient ideas of interconnectedness and the notion of belonging. People who share a respectful attitude towards nature believe that nature-friendliness and development can go together, not only for humans, but for all life forms.

Fritjof Capra, in his book The Web Of Life, (1997:7) embraces all by stating 'Deep ecology does not separate humans -or anything else- from the natural environment. It does see the world not as a collection of isolated objects but as a network of phenomena that are fundamentally interconnected and interdependent. Deep ecology recognizes the intrinsic value of all living beings and views humans as just one particular strand in the web of life.

Ultimately, deep ecological awareness is spiritual or religious awareness. When the concept of the human spirit is understood as the mode of consciousness in which the individual feels a sense of belonging, of connectedness, to the cosmos as a whole,........ the new vision of reality.. is consistent with the so-called 'perennial philosophy' of spiritual traditions, whether we talk about the spirituality of Christian mystics, that of Buddhists, or the philosophy and cosmology underlying the Native American traditions'.

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# Education in South Africa's Curriculum 2005: Developments and challenges

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**Abstract:**

Post-apartheid South Africa is currently in a period of transformation in every sphere of life, including education and training. Primarily this paper is an attempt to inform those educationists outside the midstream of EE in South Africa about some of the latest developments within the field of EE in this country.

The paper focuses on the opportunity for inclusion of environmental education (EE) into the new school curriculum ("Curriculum 2005") in the Republic of South Africa. The latest developments regarding the transformation of the education and training system in this country which opened the way for inclusion of Environmental Education is briefly explained. The rationale for including this field of study into formal education, as well as the recent developments in the country which may enhance this process, is dealt with. Emphasis is placed on the fact that the new movement which is towards outcomes-based education, is beneficial to the position of EE. The crucial role that the Environmental Education Curriculum Initiative (EECI) has been playing in the infusion of EE into Curriculum 2005 is prominent in this paper. The problems posed to teacher education for EE are also touched upon.

It must be stressed that this paper is not aimed at revealing anything dramatically new in the field of EE. It is an attempt to describe the complex and fluid situation in which EE currently finds itself in the curriculum development process in South Africa. Apart from that, the aim is, inter alia, to inform the broad community of educationists about these developments with specific reference to the implementation of EE in the new local school curriculum.

## Introduction

South Africa has a less than perfect education history with a fragmented education system (comprising a number of education departments) which succeeded in dividing people who passed through it. The system also succeeded in holding back millions of learners with its emphasis on content, passive rote learning and examinations. It is generally agreed that the work force in this country lacks relevant skills at all levels. This is partly because the apartheid education system encouraged people of all races to study information without questioning it. In the workplace people were often promoted on the basis of serving time, or after obtaining qualifications on paper that were not job-competence related.

As far as the position of Environmental Education (EE) in formal education is concerned, the situation is not very different. Despite some commendable efforts (Department of Environmental Affairs, 1989), the previous government and education system was unable to officially introduce EE into formal education, although aspects of EE were introduced on an ad hoc basis. One of the reasons why EE has been overlooked in past education reform is the fact that nature experience (education *about* and *in* the environment) has dominated many of the early initiatives (Irwin, 1990:4).

However, things are changing. Curriculum 2005 attends to South Africa's obligations to a national strategy for ecologically sustainable development. The new South African Constitution protects the right of every citizen to a healthy environment (Republic of South Africa, 1996:10). In addition, the Reconstruction and Development Programme (African National Congress, 1994:40) advocates "programmes to rekindle our people's love of the land, to increase environmental consciousness amongst our youth, to coordinate environmental education with education policy at all levels, and to empower communities to act on environmental issues and to promote environmental ethic. Accordingly the White Paper on Education and Training

(Republic of South Africa, 1995:18) and the White Paper on Environmental Policy (Republic of South Africa, 1997:35) state that EE is critical at all levels of education and in all programmes to create environmentally literate and active citizens that will ensure that South Africans have a decent quality of life through the sustainable use of resources. In the 1995 White Paper on Education and Training it is clearly stated that for the first time in South Africa's history, a government has been given the mandate to plan the development and training system for the benefit of the country as a whole and all its people.

The National Curriculum Development Committee (NCDC)'s vision for South Africa is the development of a new curriculum which "encompasses a prosperous, truly united, democratic and internationally competitive country with literate, creative and critical citizens, leading productive, self-fulfilled lives in a country free of violence, discrimination and prejudice' (NCDC, 1996:5).

### The National Qualifications Framework (NQF)

The concept of the South African NQF is the result of a long process of research-and development. This process was accelerated by the election of the new government of national unity in 1994. The process of totally changing the education and training system in this country was led on one side by the education sector, and on the other side by labour (trade unions, training boards, etc.). Both sides basically reached the same conclusions, namely that South Africa was is desperate need of a new education system.

The scaffolding for the new education system is the NQF which is now legally in place (see Fig. 1). It is aimed at empowering this country's human resources through education and training of a high standard, and integrating education by closing the divisions and gaps between "education " and "training", academic and applied knowledge, theoretical knowledge and skills, and linking the different levels of learning to each other so that learners can move more easily from one area of work, or from one learning situation, to another (Oliver, 1997).

Fig. 1: The structure of the NQF (next page)

This new system will provide learners access to nationally accepted qualifications through formal, non-formal and informal learning situations. Furthermore, different forms of learning such as full-time, part-time, distance learning, work-based learning and life experience will be recognised, and credits will be allocated and registered on the NQF. For instance, a learner who left school before completing his/her formal education, will in future be able to combine credits gained at school with those gained in the workplace to build towards assessment for a certificate.

Standards and qualification criteria on the NQF will be established and the functioning of this system will be monitored by the South African Qualifications Authority (SAQA) through a number of National Standard Bodies (NSBs) which bring together academic disciplines and employment sectors.

### The development of Curriculum 2005

Curriculum 2005 for school education forms a central part of the formal education component of the National Qualifications Framework (NQF) (see Fig. 1) which seeks to redress the past inequalities by providing access to opportunities to all South Africans.

It is foreseen that the infusion of the new curriculum, which draws on models from Australia, Canada, New Zealand, Scotland and Africa will be phased in by starting with Grade 1 in 1998 and take shape over a period of at least eight years ending in 2005- hence the name "Curriculum 2005" .

The new Outcomes-based Education (OBE) curriculum, officially launched by the national Ministry of Education on 24 March 1997 marks the beginning of a lifelong learning type of education which also encourages learners to develop at their own pace. It represents a major paradigm shift in the education system in South Africa. It changes the focus of the education system from content to outcomes; it is result driven and not content driven; it supports learners in developing in a holistic manner as they progress in achieving outcomes; and is aimed at equipping learners with the knowledge, competences and orientations needed for success once they have left school or completed their training, and for adult life in general (cf Oliver, 1997: 60, 61).

As far as learning content is concerned, the integration of knowledge is one of the key principles of the new curriculum. Previously there was a rigid division between academic and applied knowledge, theory and practice, knowledge and skills. This is rejected by Curriculum 2005. The Curriculum Development Working Group of the Department of Education identified the following eight "24 core learning areas" which replace the previous system of school subjects. It has been approved by the Council of Education Ministers as a framework and foundation for the new school curriculum:

1 .Language, Literacy and Communication [Focuses: official languages, classical languages, eastern languages, modern european languages];
2. Human and Social Sciences [Focuses: time, continuity and change, place and space, religious studies, social services (including education, law and security)];
3. Technology education [Focuses: technology, computing, technical];
4. Mathematical literacy, Mathematics and Mathematical Sciences [Focuses: mathematics, statistics];
5. Natural Sciences [Focuses: bio-sciences, physical sciences, agriculture, engineering];
6. Culture, Arts and Artistic Crafts [Focus, dance, drama, music, arts];
7. Economic and Management Sciences [Focus: economic principles, economic education, business management (including entrepreneurship)];
8. Life orientation [Focus: health education, physical education, intra- and interpersonal development, guidance, occupational learning].

The new school curriculum consists of four phases, namely the Foundation Phase (Grades 1 - 3), the Intermediate Phase (Grades 4 - 6), the Senior Phase (Grades 7 - 9), and the Further Education and Training band (Grades 10 - 12). The Foundation Phase forms the first part of the General Education and Training band of the NQF (see Fig 1), which is a nine year compulsory-schooling band. The Foundation Phase encompasses three learning programmes, namely Numeracy, Life Skills, and Literacy with an equal distribution in terms of allocated time to each of the three learning programmes. The Intermediate Phase consists of five learning areas, namely Language, Literacy and Communication; Mathematical literacy, Mathematics and Mathematical Sciences; Natural Sciences and Technology; Human, Social, Economical and Management Sciences; and Arts, Culture and Life Orientation. A strong emphasis is also placed on highly contextualised and largely integrated teaching and learning (cross-curricular themes or topics), in both the Foundation and Intermediate phases. The Senior Phase consists of all eight learning areas already mentioned. As far as the Further Education Band (Grades 10 - 12) is concerned, the debate is still on as to what it structure and content should look like.

One of the major tasks of the Learning Area Committees was to classify the broad Critical Outcomes into Specific Outcomes of which there are between seven and ten for each Learning Area (see Appendix A). This was done with the assistance of a Canadian delegation. These Specific Outcomes are meant to inform teaching and learning on a day-to-day basis in the classroom.

The next step in the development of "Curriculum 2005" was to develop Learning Programmes. Combinations of specific outcomes from the eight learning areas form the new Learning Programmes. A Learning Programme serves a similar function to that of a syllabus, except that it will allow for individual interpretation. It is also intended to serve as suggested guide for a scheme of work. Draft Learning Programmes for Grades 1 and 7 were completed (at national level) in June 1997. The final Learning Programmes for Grades 1 to 9 are to be decided on by the nine provincial education departments.

The specific outcomes in the Learning Programmes have been clustered around certain focal points, called Phase Organisers. One such Phase Organiser is `environment', making `environment' a cross-curricular feature of all new learning programmes in all phases of the General Education and Training band (compare Fig. 1). To develop units of work, or classroom-based learning programmes, central topics or Programme Organisers are used to contextualise the learning experience. Thus, in practice one can have the following:

- Learning programme: Literacy
- Phase organiser: Environment
- Programme organiser: Pollution

This example also indicates how `environment' can serve a contextualising and integrating function in the new curriculum.
A national pilot study is being undertaken at the time of the writing of this paper, in thirty schools in each province. Twenty trainers from each province will assist Grade 1 teachers in these pilot schools. Once the training of the Grade 1 teachers in the pilot schools has been completed, the provincial trainers will be responsible for intensive training of all Grade 1 teachers within each province and this will take place over the remainder of the 1997 school year. The pilot schools will attempt to implement the changes demanded by the new curriculum over a six week period, which started on 8 August. The aim is to ensure that, by the end of 1997, all Grade 1 teachers throughout the country will have been supported in the shift to OBE. Based on the feedback received from the piloting process, and from submissions from the public, the final document on implementation for Grade 1 in 1998 will be developed by December 1997. This will inform future training and development of support materials.

Once implementation of Curriculum 2005 has started in 1998, its progress will be monitored at selected schools in each province by an independent agency such as a university department or other institution.

"Curriculum 2005" - A Critique
According to Mamary (1991) outcomes-based schools are founded on the following basic premises:

- All students have talent and it is the job of schools to develop it.
- The role of schools is to find ways for students to succeed, rather than finding ways for students to fail.
- Mutual trust drives all good outcomes-based schools.
- Excellence is for every child and not just a few.
- By preparing students every day for success the next day, the need for correction will be reduced.
- Students should collaborate in learning rather than compete.
- As far as possible, no child should be excluded from any activity in a school.
- A positive attitude is essential. (If you believe that you can get every student to learn well then they will.)

Outcomes-based education calls for educational approaches that are different from those used in content-based education. OBE places an "emphasis on active modelling, expecting success, intensive engagement, diagnostic assessment, and frequent feedback to students about their performance" (Spady, 1988: 5). One of the most important features of OBE is that all students are expected to be successful. This desire to have students succeed determines what content is presented, what learning experiences are made available to students, how they are assessed, how long they engage in learning particular knowledge and/or skills, and, above all, what is valued in the educational process.

However, in the case of "Curriculum 2005", it appears to have been borrowed, warts and all, from the New Zealand/Australian/Scottish/Canadian educational OBE-systems (Committee for Development Work on the NQF, appendices B, C, G, H and I: 1996). Apparently no thought has been given to the following:

- the cultural diversity of South Africa compared to New Zealand, Australia, Scotland and Canada;
- the fact that the aforementioned are economically developed nations compared to South Africa;
- the most important fact that these countries do not have the enormous problems of inequity brought on by decades of apartheid policy;
- that, compared to South Africa, these nations have advanced educational facilities, well trained, dedicated and well paid teachers, parents who are literate and who take a keen interest in the day-to-day progress of their children, and limited numbers of pupils per classroom (in some rural classrooms in South Africa a teacher:pupil ratio of 1:80 and higher is not uncommon). OBE has worked best in wealthy countries, eg a country like Norway where you have a teacher:pupil ratio of 1:8 and every school has a social worker (Parker, 1997:41).

In other words, these countries operate in educational environments highly conducive to teaching and learning compared to South Africa. To simply transplant a curriculum paradigm and design that works well in such educationally sound environments on to one that is relatively inferior in many regards, without any significant modifications, is to invite disaster (cf. Jansen, 1997a).

Then there are other practical difficulties which might lead to a clash between ideals and reality. Jansen (1997b) remarks that "OBE is supposed to create learner-centred classrooms, substitute memory learning for understanding, and develop learners who critically apply and demonstrate what they have learnt in different contexts. How will this happen for an underqualified teacher with 60 children in a classroom designed for 25 learners with no resource material? How will this happen when in many urban township schools more than 30% of learning time is lost to non-school activities? And how can this happen without sustained training at the classroom interface?"

Jansen (1997b) also points out that the language associated with OBE is too complex, since a teacher attempting to make sense of OBE will have to come to terms with more than 75 new concepts. For example: critical outcomes, specific outcomes, unit standards, range statements, notional time, performance indicators, assessment criteria, bands, levels, phases, and their relationship to SAQA, the NQF, National Standards Setting Bodies (NSBs) Education and Training Qualifications Authorities (ETQAs), etc.

"The new plan offers a narrow, instrumentalist view of knowledge inappropriate for classroom teaching. There is a fundamental contradiction in insisting that students use knowledge creatively only to inform them the desired learning outcomes are already specified." (Jansen, 1997b).

**The Environmental Education Curriculum Initiative (EECI) and the new curriculum movement**
The EECI was established in 1996 to continue the work of the Environmental Education Policy Initialtive (EEPI) which had been active since 1992, and to encourage a broad, participatory process of curriculum development for EE in South Africa. The EECI is not an official organisation; it is a movement or initiative consisting mainly of four components, namely

- a large group of individuals representative of stakeholders in environmental education (in both formal- and non-formal educational sectors) from the nine provinces and from different levels in South Africa, e.g. Teachers' organisations, Universities, Colleges, Parks Boards, Non-governmental Organisations, and individual so-called "friends of EE".
- the Environmental Education Association of Southern Africa (EEASA).
- the Department of Environmental Affairs and Tourism which provides the communication and infrastructure support.
- the Human Sciences Research Council (HSRC)\'s Division for Environmental Management which has recently launched a number of research projects within the framework of a broader project called "A Facilitative Programme for Environmental Education Curriculum Development".
- Working groups to identify needs and initiate projects for teacher education, curriculum research, development of resource materials, and learning programme development have been established in the EECI. The EECI is supported financially by Gold Fields Mining Company through the Green Trust (SA) and the Department of Environmental Affairs and Tourism.

The EECI has been given the opportunity to formally contribute to the development process of Curriculum 2005 in that it took part in the Department of Education's national curriculum workshops during 1996, and was officially represented on the Learning Area Committee for Human and Social Sciences. The EECI has also been represented at all the Co-ordinating Committees and phase committees involved in the development of learning programmes for the new curriculum.

The role of the EECI regarding Environmental Education in Curriculum 2005
The White Paper on Education and Training (Department of Education, 1995:20) states:
"Environmental education, involving an interdisciplinary, integrated and active approach to learning, must be a vital element of all levels and programmes of the education and training system, in order to create environmentally literate and active citizens and ensure that all South Africans, present and future, enjoy a decent quality of life through the sustainable use of resources."

Environmental education must be continuous; it must pervade as many subject areas as possible at all grade levels in the school curriculum; and it must offer pupils experiences that are as concrete and direct as possible, involving them in participation by investigating real environmental problems and issues in their own community and enhancing feelings of commitment and ownership in a positive, yet impartial and critical way.
Engleson and Yockers (1994:14) state that the goal of EE is to help students to "become environmentally aware, knowledgeable, skilled, dedicated citizens who are committed to work, individually and collectively, to defend, improve, and sustain the quality of the environment on behalf of present and future generations of all living things."

From this goal statement these authors have developed the following five aims (subgoals):

- *Perceptual awareness* : "To help students develop the ability to perceive and discriminate among stimuli; to process, refine, and extend those perceptions; and to concurrently acquire an aesthetic sensitivity to both natural and built environments."
- *Knowledge:* "To help students acquire a basic understanding of how the natural environment functions, how its functioning is affected by human activity, and how harmony between human activity and the natural environment may be achieved."
- *Environmental ethic*: "To help students develop a universal ethic on which they may act to defend, improve, and sustain the quality of the environment. "
- Citizen action: "To help students develop the skills needed to identify, investigate, and take action toward the prevention and resolution of environmental issues."
- *Citizen action experience*: "To help students gain experience in applying acquired perceptual awareness, knowledge, an environmental ethic, and citizen action skills in working toward the prevention and resolution of environmental issues at all levels, local through universal."

This list of aims of EE is meant to represent a hierarchy in the sense that citizen action skills and experience cannot be achieved without the other aims. However, this basic model has been challenged repeatedly in research. One important point of critique is that it is an oversimplification to assume that action skills can evolve naturally from a knowledge base in a linear way (Hungerford & Volk, 1990). Hausbeck, Milbrath and Enright (cited by Emmons, 1995:67) suggest that "knowledge, awareness, concern ... are so interactive and reciprocally causative that we can only say they form a learning system." However, the truth of the matter is, students should have an opportunity to be educated so that they can respond appropriately to environmental problems that will arise in their lives. To be able to do so, they need to be taught problem-solving and decision-making skills. An appropriate knowledge base is also critical to working in this area.

The implementation of an OBE-based curriculum model is probably one of the most meaningful developments in the field of education in terms of the implications for EE in the school curriculum in South Africa. The cause of EE will without a doubt be significantly promoted. One of the most important reasons for this is the fact that some of the most prominent essential characteristics of EE *for* the environment is in line with an outcomes-based approach in teaching which forms the basis for Curriculum 2005.

Fien (1993:12) proposes the following as the essential elements of education "for" the environment:
Education *for* the environment

1. emphasises the development of a critical environmental consciousness based upon:
    - a holistic view of the environment as a totality of the interdependent relationship between natural and social systems;
    - a historical perspective on current and future environmental issues; and
    - the study of the causes and effects of environmental problems, and alternative solutions to them, through an examination of (a) the relationships between ideology, economy and technology, and (b) the linkages between local, regional, national and global economies and governments.
2. accentuates the development of problem-solving and critical thinking skills. This is achieved through a variety of interdisciplinary, practical learning experiences which focus on real-world problems and involve the study of a wide range of sources and types of information.
3. tab stresses the development of the understandings, attitudes and skills of political literacy

which promote participation in a variety of forms of social action to help improve and maintain environmental quality.
4. tab emphasises the development of an environmental ethic based upon sensitivity and concern for environmental quality.
5. requires teaching strategies and methods that are consistent with its goals.

Education *for* the environment seeks to help pupils develop the skills needed to identify, investigate, and take action toward the prevention and resolution of environmental issues. It is also aimed at helping pupils to gain experience in applying their acquired awareness, knowledge, action skills and environmental ethic. Therefore, education *for* the environment seeks to engage pupils in the active resolution of environmental issues and questions. This involves a wide range of knowledge, skills, values and action objectives which are not addressed by simply teaching environmental facts and concepts (education *about* the environment) or by experiential learning in nature (education *through* or *in* the environment). According to Stevenson (Fien, 1993:5) this involves engaging pupils in "...the intellectual tasks of critical appraisal of environmental (and political) situations and the formulation of a moral code concerning such issues, as well as the development of a commitment to act on one's values by providing opportunities to participate actively in environmental improvement." The methods of citizen action that pupils need to study and experience could include: ecomanagement; persuasion; different forms of consumer action (direct and indirect boycotts, conservation, monetary and volunteer support, economic patronage); political action; and legal action.

The proposed outcomes, originally labelled `essential outcomes' but later modified as `critical outcomes' for the new National Qualifications Framework (and as such also for "Curriculum 2005") are the following (SAQA, August 1996):
[Learners should be able to]
1. "Identify and solve problems in which responses display that responsible decisions using critical and creative thinking have been made.
2. Work effectively with others as a member of a team, group, organisation, community.
3. Organise and manage one's activities responsibly and effectively.
4. Collect, analyse, organise and critically evaluate information.
5. Communicate effectively using visual, mathematical and/or language skills in the modes of oral and/or written presentation.
6. Use science and technology effectively and critically, showing responsibility towards the environment and the health of others.
7. Demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not arise in isolation."

In addition to these seven, individuals have to become aware of the importance of:
- Utilising strategies to learn more effectively;
- Participating as responsible citizens;
- Being culturally and aesthetically sensitive;
- Exploring education and career opportunities;
- Developing entrepreneurial abilities.

These critical cross-field outcomes are generic and cross-curricular. They are not restricted to any specific learning context, but they inform the formulation of specific outcomes in individual areas of learning for all learners at all levels on the National Qualifications Framework. They are working principle s, and as such they should direct teaching, training and education practices and the development of learning programmes and materials.

Environmental Education can contribute to the realisation of each of the foregoing Critical Outcomes and furthermore, the underlying meaning thereof reflects, to a large extent, the character of EE *for* the environment. In this regard some of the characteristics of EE the environment that immediately come to mind are: the development of a commitment to act on one's values by providing opportunities to participate actively in environmental improvement; an emphasis on the development of problem-solving and thinking skills through interdisciplinary, practical learning experiences which focus on real-world problems; and the promotion of participation in a variety of forms of social action to help improve and maintain environmental quality (Fien 1993:12).

Also with regard to two other important dimensions of the new curriculum, namely the role of the teacher and assessment, EE links up closely with the outcomes-based approach to learning. In short: in OBE the role of the teacher changes to that of a facilitator; nurturing and supporting; assessing learners in order to help them improve; working in a team; and guiding learning, not transmitting knowledge. Assessment becomes an integral part of learning; it is on-going; it assesses knowledge, together with attitudes and skills; it helps learners to succeed; and both teachers and learners will use a rich variety of assessment methods to assess learning progress towards the specified outcomes.

Thus far in this section it has become obvious that EE clearly fits into the proposed product ("outcomes") and the methodology of the new learning programme. Also, as far as the structure of the proposed learning programme imbedded in Curriculum 2005 is concerned, the potential for including EE is very clear. Environmental Education as an orientation is potentially integral to each of the eight learning areas in the new curriculum mentioned earlier, permeating the curriculum as an approach to education and as a particular focus (amongst others) within each core learning area (compare EECI, 1996c). "
All the eight areas of learning mentioned can be extended and enhanced significantly by the principles, processes and concepts central to environmental education" (EECI, 1996a:2).

In an attempt to support policy and curriculum initiatives, the Environmental Education Curriculum Initiative proposed the following range of policy options for EE in the new curriculum (EECI, 1996b):

1. EE as an integrated approach (an environmental perspective within separate subjects).
   Each subject has a unique place in the curriculum, yet most have a role to play in EE. Almost every subject can make a different yet complementary contribution by incorporating an environmental perspective wherever possible - much like an EE "flavour" permeating the curriculum where appropriate. In this case an environmental perspective within a subject will draw on the unique capacities of that particular subject content to provide a richer educational experience for the pupils without manipulating subject integrity and ethos in an artificial way.
2. EE as local, environmental problem-solving curriculum action.
   This involves a team approach where the focus is on real, local environmental issues and whereby a participatory approach to EE is implemented and direct curriculum linkages with social and/or bio-physical aspects from the community are established. Ideally this will also engage teachers in action research towards continual improvement of curricula through first-hand involvement with their immediate environment with the co-operation of (a) a coordinating EE-teacher in every school, and (b) appropriate resource people in tertiary institutions and NGOs.
   This approach could also link up fruitfully with any EE activities in the school's extracurricular learning programme.
3. EE as a separate subject.
   This could take the form of Environmental Studies at lower primary level (Foundation Phase);Education for Sustainable Living at middle school level (Intermediate Phase); and Environmental Studies as an optional specialist subject at further education level.
4. EE as a component or module within a subject.
   There could be specific environmental content in a range of subjects. For example, in Chemistry, where the environmental implications of what is being dealt with are examined (sources of raw materials, by-products, chemical waste, etc.). In much the same way History could include a component on the history of environmentalism as a social movement (see Goodall, 1994b: 43-92).

All of these can be adopted according to various needs and at various stages and levels within the curriculum. They are not mutually exclusive and allow for flexibility, relevance and a local emphasis.

However, as the process of developing Curriculum 2005 unfolded, the position of EE in the different learning areas changed somewhat. Of the original total of 500 specific outcomes that had been generated by the eight Learning Area Committees for the General Education Band, only 66 specific outcomes remained (See Appendix A) after refinement in the different learning areas (the majority of original specific outcomes were changed to either range statements or assessment criteria) (Mosidi, 1997: 17). This resulted in some learning areas having specific outcomes which, at first glance, do not link up directly with EE, eg. A3, A5, B1, B, C, D1, D2 , D6, E6 , E8 , F3 in Appendix A. This prompted the EECI to release a document, "Enabling Environmental Education as a cross-curricular concern in outcomes-based learning programmes" in April 1997 (EECI, 1997). This document aims at assisting the Provincial Education Departments' learning programmes development to design learning programmes" framed by the specific outcomes against the background of the environmental context of reconstructive development and social justice in South Africa in all bands and at all levels of education and training in all learning areas (EECI, 1997:4). In practice, it also indicates the possible interpretations of those specific outcomes without an obvious EE-link, in such a way as to make an EE approach possible without jeopardizing the context of those specific outcomes. In this document (EECI, 1997: 9) with reference to the March 1997 Curriculum Framework Document, "grave concern is expressed by the disregard for issues of sustainability and cross curricular inclusion of environmental concern." It further states that consideration of the environmental context of learning which, if viewed through "learning area lenses" shows how environmental concerns are an integral part of each learning area, and thus demonstrates the cross curricular nature of EE (EECI, 1997:10). Three possible ways of environmentally contextualising the specific outcomes are then offered in the document as possible approaches to learning programme development, namely (a) a topic-outcomes approach, (b) a thematic-outcomes approach, and (c) an issue-base d approach (see EECI, 1997: 25-40 for examples of implementation of these approaches in the different learning areas).

It is hoped that in the unfolding of the development of Curriculum 2005 the above mentioned, as well as possible further inputs of the EECI will contribute to EE taking its rightful place in the new educational dispensation in South Africa. The national task team of the EECI have already clarified a future role and orientation for the EECI to change from a curriculum initiative to a curriculum capacity building project.

### Teacher education for Environmental Education in Curriculum 2005

Teacher education is regarded as a priority activity and a key factor in the development of environmental education (Brundtland, 1991:4-5; UNESCO-UNEP, 1988:12; Fien, Gough, Robottom & Spork, 1993:vi). Sterling claims that "the key to school commitment to environmental education lies with the teachers" (Ballantyne, 1990:18). It has also been stated that "the possibilities of integrating Environmental Education into formal and non-formal education programmes depend essentially (without however underestimating the importance of other factors) on the training of the personnel responsible for putting the programmes into effect" (UNESCO-UNEP, undated: 13). The author of this paper believes that an effective model for teacher education in environmental education is crucial to the success of environmental education (EE) in South African schools. Albeit with the best intentions, EE in schools will struggle to get off the ground effectively without a concerted effort to establish a well-educated corps of environmentally literate teachers as quickly as possible. Teacher education can be such a hurdle to fine-sounding curriculum documents ever coming close to being realised in practice. The simple truth is that without committed teachers who are environmentally aware and literate themselves and who believe in and know how to teach from an environmental perspective, successful EE programmes and structures cannot be successfully implemented."Teachers hold the key, at least to that part of environmental education that takes place in formal education. Given the immensity of the task to be accomplished and the limited resources available, it makes sense to place a major emphasis on the teaching of teachers in that they directly and indirectly influence large numbers of students, and the lay community." (Selim, 1977:127). This makes teacher education in EE a vital prerequisite in the future prospects of EE in South Africa.

"Teacher-training programmes need first of all to instill in the teachers themselves the kind of sensitivity towards the environment that they will be asked to help develop in their students" (Selim, 1977: 140). If not treated as a priority in the new South Africa, teacher education (especially with regard to EE) can become a bottle-neck in the delivery process inherent in educational innovation and the restructuring of the education system in this country (EEPI, 1995:14). After all, teachers are the corner-stone of any educational effort and thrust. Therefore, knowledgeable, well-informed and committed teachers are crucial as far as the implementation of EE in a newly structured school curriculum is concerned. It is therefore comforting that the Committee on Teacher Education Policy's recent discussion document on teacher education in the new South Africa acknowledges that: "Teacher education should enable student teachers to develop those values, attitudes and dispositions which advance - .....environmental awareness and a knowledge of ecology and natural systems. " (COTEP, 1995:7-8). In the latest policy document on teacher education in South Africa, "Norms and Standards for Teacher Education", dated July 1995, it is stipulated that teacher education programmes for all phases of education (even for adult basic education) should ensure that the teacher will be able to teach EE (Department of Education, 1995: 28, 30, 31, 32). The Department of Environmental Affairs and Tourism also states that "(t)here is a great need for knowledgeable teachers who can take the lead in matters regarding education at all levels of the education system." (Department of Environmental Affairs and Tourism, 1995:118).

It appears as if the future success of EE in South African schools is at this stage at least partly in the hands of teacher education institutions. "Teachers, in order to face the task of curricular reorganization demanded by environmental education, must handle, besides the traditional aspects of their sciences (physics, chemistry and biology), the social, political and cultural aspects as well. To be able to do this their training must be quite different from that which they now receive" (Krasilchik, 1987:104). Thus, the concepts, skills and teaching methodologies required for EE should become a fundamental part of all teacher education programmes. The question arises whether the issue of EE is viewed with the necessary seriousness and commitment to incorporate it to its full extent into the existing (and quite often overloaded) teacher education programmes. Time is an important factor. All teacher education institutions should be involved in training their education students for EE. Unfortunately at the moment this is only an ideal in the South African context - too many teacher education institutions have not yet made provision for EE in their curricula.

The aim should be to equip teachers to become, together with their students, active participants in identifying, solving and preventing environmental problems arising from human activities and natural events that threaten to degrade the environment and the quality of life in their immediate surroundings. The aim is also to enable teachers to be proactive in environmental issues in their local communities, not just reactive.

The author supports the following views expressed in recent official policy documents:

- During their initial pre-service education, all student teachers in South Africa should be exposed to EE in an effort to improve their environmental literacy level (Department of Education, 1995: 28, 30, 31, 32).
- EE should be a compulsory component of the teacher education curriculum (EEPI, 1995:12; Department of Environmental Affairs and Tourism, 1995:115; Clacherty, 1994).
- This exposure of student teachers to EE could take the form of the formal content of a module of a broader course as part of a diploma or degree. It could also be more informal in cases where it forms part of general formative activities which the students are exposed to during their education.

Although EE in pre-service teacher education is important, the immediate priority for the fast and effective implementation of EE in schools must be the provision of in-service education to teachers (INSET) in order to improve their level of environmental literacy. In 1994 it was estimated that in South Africa half of the current national teaching corps of 324 000 is un-/underqualified. (Jaff, Rice & Hofmeyr, 1994:1). Kahn (1993:8) mentions a figure of 87% underqualified teachers from the former Department of Education and Training. Several teacher education institutions are, however, now offering such underqualified teachers the opportunity to upgrade their qualifications - mainly via in-service teacher education (INSET) programmes and in many cases through distance education.

Although demographic indications in South Africa, especially the growing proportion of young Africans in the population (Hofmeyr & Buckland, 1992:39) suggest INSET efforts should mainly be aimed at the primary school level, this observer believes that, to avoid a teacher education backlog once EE becomes part of the total school curriculum, we should strive towards improving the environmental literacy of teachers across the whole spectrum of school levels.

What is more, the holistic, issue-based, problem-solving approach of EE (Eichler, 1977; Glasgow, 1994:9; EEPI, 1995) emphasizes participatory decision making, critical thinking and socially responsive action. This is a new approach for the majority of teachers and in some ways conflicts with traditional teaching practice in most schools. This is another important reason why teachers need in-service education.

Some possible problem areas regarding EE teacher education

(1) The need for more financial resources has been and still is a critical limitation of most INSET initiatives, especially given the current constrained economic climate. Even the most

cost-effective teacher education strategy still needs funding. Considering the staggering financial implications of the new government's Reconstruction and Development Plan (African National Congress, 1994) in the immediate future, we should be realistic in our expectations of what can be done budgetwise with regard to the implementation of EE in the South African educational system. Funding will have to come from sources other than the state treasury. The business sector and foreign donors have an important role to play in provision, as well as needs analysis, resource development, education and evaluation of teacher education programmes for EE.

(2) Staffing also needs urgent attention as lecturers at teachers education institutions themselves have to a large extent not been trained in EE. Development of practising staff at teacher education colleges an d universities therefore has to be a priority.

(3) The post-apartheid period is currently marked by the rapid expansion of the black school population (Hofmeyr & Buckland, 1992:39), and an equally rapid increase in the shortage of classrooms. Therefore, the education of teachers in handling large class-groups (80 pupils and even more) will soon become a critically important priority in this country. It is also clear that the distinctiveness of the teaching strategies and learning opportunities being created for the students in EE (active learning based on dialogue and interaction, hands-on work, the development of action competencies in learners, action research, etc.) demands much more from the teacher's managerial skills than in the teaching of most of the traditional subject fields found in the school curriculum.

(4) For the education and training challenges and difficulties in a changing South Africa, but especially for teacher education, the great importance of distance education and training cannot be over-emphasized. We simply do not have access to resources sufficient to meet the demands for teacher education and training via conventional residential-type teacher education courses. Furthermore, we do not have the time in which to make up for our education and training backlogs using such conventional means of teacher education. Many teachers, especially in rural areas, are far from universities, colleges or teacher centres. Hence, distance education is increasingly advocated as the realistic mode of in-service teacher education in the country (Teacher Opportunity Programmes, 1990; Department of Environmental Affairs and Tourism, 1995:118). Already distance education is being used on a large scale, primarily for upgrading the qualifications of serving teachers in general. However, South Africa needs innovative models of in-service teacher education for EE which employ distance-learning techniques that incorporate the best international practices of open learning (but adapted for the South African context). These techniques are, at the same time, less expensive and labour intensive than traditional approaches. We will, however, have to bear in mind that distance education is only as good as the support materials. Innovative support strategies and materials will have to be put into place.

(5) Finally: A major challenge to our teacher education strategies will be to comply with the criteria Robottom has identified for EE teacher education programs (Fien, et al., 1993:ix-x), namely:

- Programs should be inquiry based in order to encourage participants to adopt a research stance towards their own EE practices.
- They should be participatory and practice-based.
- They should be critical in that they involve an ideological critique of the environmental and educational assumptions and values that underlie EE policies, resources and practices.
- They should be community-based.
- They should be collaborative.

## Summary and Conclusion

In South Africa a number of significant activities are currently taking place towards the shaping of a new curriculum for general education. The new National Department of Education aims to have the new "Curriculum 2005"designed and implemented in all South African schools by the year 2005, starting in 1998 with the first phasing in. The new curriculum will support the principles of an outcomes based system which will be built around a series of essential outcomes which are generic and applicable to eight identified core learning areas, together with specific outcomes which are specific to each of the areas of learning.

Environmental Education is mentioned as a principle of the Government's 1995 White Paper on education and training and thus should form part of the restructuring of new curricula for general education in South Africa. All eight areas of learning can be extended and enhanced significantly by the principles, processes and concepts central to environmental education. A number of significant developments have contributed towards a positive setting for the implementation of Environmental Education in the new curriculum.

A comparison between the essential characteristics of EE *for* the environment and those of the Essential and Critical outcomes of the NQF and Curriculum 2005 respectively, reveals some important commonalities, that are encouraging to environmental educationists. It opens the prospects for EE to becoming an integral part of the daily activities in South African classrooms.

The success of "Curriculum 2005" is not guaranteed. Some crucial factors which will play a role in the successful implementation of the new curriculum (and EE as part thereof), were not addressed in this paper, for example the enormous task of teacher education (both pre- and in-service) for OBE in general and EE in particular; the (unrealistic?) relatively short time-span in which the new curriculum must be developed and implemented; and the very high student:teacher ratios (sometimes 1:80 plus) in some rural schools in certain parts of the country.
Time will tell if this nation can succeed in changing its education and training system according to the many ideals embedded in the new movement in this field. Environmental Education, however, has never been in a better position than it is currently, to become part of every citizen's education in South Africa.

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| School Grades | NQF Level | Band | Types of qualifications & certificates | |
|---|---|---|---|---|
| | 8 | Higher Education and Training Band | Doctorates<br>Further research degrees | |
| | 7 | | Degrees, Diplomas & Certificates | |
| | 6 | | | |
| | 5 | | | |
| Further Education and Training Certificates | | | | |
| 12 | 4 | Further Education and Training Band | School/College/NGOs<br>Training certificates, Mix of units | |
| 11 | 3 | | School/College/NGOs<br>Training certificates, Mix of units | |
| 10 | 2 | | School/College/NGOs<br>Training certificates, Mix of units | |
| General Education and Training Certificates | | | | |
| 9<br>8<br>7 | 1 | General Education and Training Band | Senior Phase | ABET 4 |
| 6<br>5<br>4 | | | Intermediate Phase | ABET 3 |
| 3<br>2<br>1 | | | Foundation Phase | ABET 2 |
| R | | | Pre-school | ABET 1 |

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*training of primary school teachers in the Asean region*, UNESCO-UNEP Environmental Education Series No. 41. Paris: UNESCO.

## Appendix A: Specific Outcomes for the eight Learning Areas of "Curriculum 2005"

**A) Arts and Culture**

1. Apply knowledge, techniques and skills to create and be critically involved in arts and culture processes and products.
2. Use the creative processes of arts and culture to develop and apply social and interactive skills.
3. Reflect on and engage critically with arts experience and works.
4 .Demonstrate an understanding of the origins, functions and dynamic nature of culture.
5. Experience and analyse the role of the mass media in popular culture and its impact on multiple forms of communication and expression in the arts.
6. Use art skills and cultural expressions to make an economic contribution to self and society.
7. Demonstrate an ability to access creative arts and cultural processes to develop self esteem and promote healing.
8.A cknowledge, understand and promote historically marginalised arts and cultural forms and practices.

**B) Economic and Management Sciences**

1 .Engage in entrepreneurial activities.
2. Demonstrate personal role in economic environment.
3. Demonstrate the principles of supply and demand and the practices of production.
4. Demonstrate managerial expertise and administrative proficiency.
5. Critically analyse economic and financial data to make decisions.
6. Evaluate different economic systems from various perspectives.
7. Demonstrate actions which advance sustained economic growth, reconstruction and development in South Africa.
8. Evaluate the interrelationships between economic and other environments.

**C) Human and Social Sciences**

1 .Demonstrate a critical understanding of how South African society has changed and developed.
2. Demonstrate a critical understanding of patterns of social development.
3. Participate actively in promoting a just, democratic and equitable society.
4. Make sound judgements about the development, utilisation and management of resources.
5. Critically understand the role of technology in social development.
6. Demonstrate an understanding of interrelationships between society and the natural environment.
7. Address social and environmental issues in order to promote development and social justice.
8. Analyse forms and processes of organisations.
9. Use a range of skills and techniques in the Human and Social Sciences context.

**D) Language, Literacy and Communication**

1. Learners make and negotiate meaning and understanding.
2 .Learners show critical awareness of language usage.
3. Learners respond to the aesthetic, affective, cultural and social values in texts.
4 .Learners access, process and use information from a variety of sources and situations.
5. Learners understand, know and apply language structures and conventions in context.
6 .Learners use language for learning.
7. Learners use appropriate communication strategies for specific purposes and situations.

**E) Life Orientation**

1. Understand and accept themselves as unique and worthwhile human beings.
2 .Use skills and display attitudes and values that improve relationships in family, group and community.
3. Respect the rights of people to hold personal beliefs and values.
4. Demonstrate value and respect for human rights as reflected in }{\i Ubuntu}{ and other similar philosophies.
5. Practice acquired life and decision making skills.
6. Assess career and other opportunities and set goals that will enable them to make the best use

of their potential and talents.

7. Demonstrate the values and attitudes necessary for a healthy and balanced lifestyle.
8. Evaluate and paticipate in activities that demonstrate effective human movement and development.

**F) Mathematical Literacy, Mathematics and Mathematical Sciences**

1. Demonstrate understanding about ways of working with numbers.
2. Manipulate number patterns in different ways.
3. Demonstrate understanding of the historical development of mathematics in various social and cultural contexts.
4. Critically analyse how mathematical relationships are used in social, political and economic relations.
5. Measure with competence and confidence in a variety of contexts.
6. Use data from various contexts to make informed judgements.
7. Describe and represent experiences with shape, space, time and motivation, using all available senses.
8. Analyse natural forms, cultural products and processes as representations of shape, space and time.
9. Use mathematical language to communicate mathematical ideas, concepts, generalisations and thought processes.
10. Use various logical processes to formulate, test and justify conjectures.

**G) Natural Sciences**

1. Use process skills to investigate phenomena related to the Natural Sciences.
2. Demonstrate an understanding of concepts and principles, and acquired knowledge in the Natural Sciences.
3. Apply scientific knowledge and skills to problems in innovative ways.
4. Demonstrate an understanding of how scientific knowledge and skills contribute to the management, development and utilisation of natural resources.
5. Use scientific knowledge and skills to support responsible decision-making.
6. Demonstrate knowledge and understanding of the relationship between science and culture.
7. Demonstrate an understanding of the changing and contested nature of knowledge in the Natural Sciences.
8. Demonstrate knowledge and understanding of ethical issues, bias and inequities related to the Natural Sciences.
9. .Demonstrate an understanding of the interaction between the Natural Sciences and socio-economic development.

**H) Technology**

1. Understand and apply the Technological Process to solve problems and satisfy needs and wants.
2. Apply a range of technological knowledge and skills ethically and responsibly.
3. Access, process and use data for technological purposes.
4. Select and evaluate products and systems.
5. Demonstrate an understanding of how different societies create and adapt technological solutions to particular problems.
6. Demonstrate an understanding of the impact of technology.
7. Demonstrate an understanding of how technology might reflect different biases, and create responsible and ethical strategies to address them.

# Environmental Education for the Early Years: ALL about me and My skin, as examples of programme organisers to engage young children in inquiry and exploration of their environment

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## Introduction

Research has proven that it is necessary to start at an early age to nurture skills and attitudes to promote the development of environmentally responsible adults (Hendrick 1988 & Palmer 1995). Young children also have an insatiable curiosity about their environment.

The outcome of Environmental education in this presentation is to provide young children with the knowledge, skills and attitudes required to take environmentally responsible actions. The purpose here is to interpret Environmental Education in terms of teaching strategies and experiences relevant to the developmental level of young children (preschooler's 3-6 years).

It should be noted that Environmental Education, at Early childhood level, is not simply doing a few outdoor activities exploring plants and animals. In this paper an attempt is made to demonstrate how Environmental Education can be integrated into all aspects of a programme to cover the appropriate learning areas in the new Outcomes-based Education (OBE) approach in South Africa.

Through Environmental Education we can promote the development of individuals, who will understand, protect and act in a responsible way towards the environment in which they live. While it could be appropriate to explain the reasons why the ozone layer is breaking down to a twelve-year-old or even an eight-year-old, the majority of younger children would not grasp the concept. Elliot and Emmett (1991) state that one can begin by assisting young children in their understanding of the previously mentioned concept by means of developing more basic concepts such as the sun, air, pollution and skin protection. For example we may introduce Environmental education to young children by making use of activities which fit in with themselves in their immediate environment and gradually moving on to activities which are further removed from their life world.

***ALL about me, My skin, light, colours***, amongst others could then be a programme organisers which could serve as interest themes by means of which the appropriate learning areas (OBE) could be presented in an integrated way in learning programmes.

## Environmental Education outcomes in the Early years

In order young children to eventually model behaviour by which the following specific outcomes can be recognised, the following messages could be given with regard to the child's natural and manmade environment. These could be incorporated in a learning programme.

## Important concepts in Environmental Education for young children

We can promote awareness of and caring for the environment by exposing the child to the following concepts:

### 1 The interrelatedness among everything on earth and that we are dependent on each other and the environment

Nobody can exist on his own. We cannot exist independently of the environment and we also have an influence on the environment. We need air, food, water and each other. We are dependent on plants for food and we can take care of plants. Plants need sunlight, good soil and water to grow. Plants make the oxygen we breathe and help to keep the air clean. Animals also need air to breathe, as well as food and water. By being made aware of their dependence, as well as those of plants and animals, on the

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earth's resources, the child gradually realises that taking care of them (conservation) is important.

**2 We live in the environment**

All living things (humans, plants and animals ) live in certain environments which are suited to them. Children should also know where they live - where their homes are and whether they live in an urban or rural area: a farm, a town or in the city. Every plant and animal has a natural home which we call their habitat. A habitat includes food, water, shelter. Most plants and animals are specifically adapted for life in their habitats (We care 1993: 18). We can think here of a pond as the habitat of fish and whatever lives in it, a tree as habitat for birds and other creatures who live in it, and so forth. We can encourage children to look for evidence of how us humans have influenced our surroundings - have we improved or damaged natural habitats. For example if an animal's food is destroyed (by detergents and waste destroying a river), it will have to move away or starve. Other animals and plants will also be affected because animals depend on one another, hunt one another and cooperate with each other. If part of a tiny web of life is destroyed, it affects the other parts.

**3 We need to care for and look after the environment**

We need to take care of this environment by keeping it safe and clean for those who live in it; not spoiling it and conserving its resources (saving water and recycling products).
The environment also needs protection from children. Small ecosystems, such as the insect colonies that may be found under a log or rock, may be easily destroyed if the log or rock isn't carefully replaced. Earthworms shouldn't be exposed to the sun for more than a minute or two, and nothing can live in a glass jar, even if there is a hole punched in a lid for longer than a day or two. The general rule is, insects and other animals found outdoors, belong outdoors; they are not the property of the finder. The child can observe them and share them with others, then return them to the place they were found. Letting creatures go is a part of the learning experience.

What young children do for the environment should be observable. They need to see the direct results of their actions. For example, children can see the direct result of picking up trash

## Implementing an Environmental Education Programme according to the thematic approach by means of programme organisers

Much depends on adopting approaches for exposing young children (five year Olds and younger) in the ***preschool phase*** to environmental education in a relevant and meaningful way for them - the how is as important as content. The most important principle of learning for children of five years and younger is that ***they learn in concrete, experiential ways, by means of real experiences which form part of their life world***, rather than through abstract processes far removed from their life world. The ***thematic approach***, which places content in the child's life in context, is proposed in this presentation and will be illustrated in due course.

Attention will be given to:
1. specific planned experiences, as well as
2. creative play experiences through imaginative play

## THEMATIC APPROACH

A thematic or project approach underlies the ***Theme-based Curriculum*** which is used in the preschool phase. Themes/Concepts are used to:

- ***organise activities in the learning areas*** provided for in Preschool.
- these themes are ***based on the natural interests of young children*** and
- ***the happenings which occur in their life worlds***.
- It ***places knowledge in context*** for the young child.
- it ***integrates all the components of the child's development*** in a meaningful way.

Planning a theme-based curriculum is open-ended and flexible - the suggested themes (program organisers) and activities in this presentation are only starting points. You should choose those activities that best meet the interests and needs of your particular group of children. The preschooler thinks about the world primarily in terms of actions that can be performed, so the choice of concepts/themes must provide for action-orientated, child-initiated plans and activities. Themes to use as programme organisers usually evolve from the child and his or her interests (themselves and their families, their homes, stories, the environment and so forth). Children's comments and questions about each activity will lead you to ideas for extensions and modifications to the suggested activities. Similarly, the interests of your group can lead you to new themes which will branch out of the original theme, for example *Myself ⇨ my skin ⇨ light ⇨ sun ⇨ colours.*

### Implementing Programme organisers to develop curriculum webs for the different learning areas in OBE

### Programme organiser
### 1. All ABOUT ME

Children in the preprimary and foundation phase usually know what they look like. They know that they have two arms, two legs, two ears, two eyes and a nose. They know that they can move from place to place using their legs, and if they scratch themselves they will bleed, but also heal. They will also realise that they have to eat and drink, and connect this vaguely with growing and staying alive, but not really understanding what this means. They really don't know that they belong to that group of animals known as mammals (being warm-blooded, vertebrate (having a bony framework), and are suckled - the only difference is that unlike animals they have taken an erect position for walking about), therefore they have something in common with cows, mice and hedgehogs. Any environmental education project undertaken with young children should include looking at living things in general, and themselves in particular, so that they will begin to understand something of themselves and the need to take care of their bodies. Any study of ourselves can include basic health education - care of the skin, nails, hair, feet, eyes and ears, clothing, food and exercise. Other program organisers suitable for young children would be to include their families and homes. From these familiar program organisers we could gradually move to organisers further removed from the learners immediate environment.

### All About Me as Programme Organiser to implement the Learning Areas identified for Curriculum 2005:

**Communication, literacy and Language learning**
Vocabulary: body parts, feelings:
happy, sad, glad good (find words that
rhyme with these); find pictures that match
the words. Small, little, big large, huge.
prickly, sunburn, wet burn,
dry burn; pollution.
Look at pictures and discuss,
read and tell stories, draw pictures
write sentences and sing songs

**Natural sciences**
I have an inside and an outside
I grow and change, I need food, a
Home and clothes;
Observe, compare, predict,
experiment, classify, infer
**around skins** - their abilities to
see, hear, smell, feel.
Interdependence with each
other/ environment

All about me

**Numeracy and mathematics**
Classify according to colour of eyes
making a graph to communicate
findings; count body parts, heartbeats, time line
Family tree, body size (taking up space
lying down, standing up)
Technology: designing and making
shoes from waste materials.
Measure first with body parts; Order
from shortest too tallest (I am ten hands tall)

**Life Orientation**
How do I move; how do
I move safely; where can
I move safely. Whom do I trust?
What do I do when I get lost?

**The arts & Culture**

**Music & movement**
Clap hands according to syllables
in children's names,

**Creative art**
Create people using geometric forms
Draw around the body with crayons and

Clap hands according to a pattern ●●● - - ●●●

Jump according to a pattern
Songs & rhymes about body parts
**Activities to promote specific outcomes in the program**

**colour in with paint; cut out and compare sizes and lengths**
Assemble & paste figures cut into 3 parts

**Intended specific outcomes with this activity**
- ❖ Children know that they are human and have special needs
- ❖ Children understand that they are part of a community
- ❖ Understanding their interdependence with the environment
- ❖ Be able to use and survive in the environment

ACTIVITIES AND EXPERIMENTS

**Location:** **Classroom**

**Apparatus for activities and method of presentation**

1. Taking a look at MYSELF:

● Get children to get a general look at themselves and each other. What are the things they all have in common? They all breathe, eat, grow; they can see, hear and feel things

● What shapes are humans? (Art activity - draw each other's outline with crayons while lying on a large piece of paper on the ground; Cut out and finish off by painting.)
Basically all humans are the same shape, but also discuss the differences between us - boys, girls; tall and short; fat and thin. Order the final products of the body shape activity from the tallest to the shortest.

● Make a picture graph about the different eye, hair colours of the group.

● **As skin covers the whole of our bodies (following organiser flowing out from this organiser), its importance is obvious. Find out it's functions, and find out how it should be cared for. Carry on with caring for other body parts as well. Teeth (science - make own tooth paste) etc.**

● Look at eyes and ears. Devise experiments to find out how far we can see and hear things. Find out how eyes and ears are used in making decisions. (This can play a part in safety. For example - is that plank wide enough to walk on? I can't see the traffic but I can hear something. Is this important? Look at the other senses as well.

● We are what we eat! Helping children establish good health habits early is important. Include information about the types of foods needed and teachers should have knowledge about the amounts that should be eaten.

● The internal anatomy of the body is a difficult concept for a young child to understand. Concrete experiences on which to base understandings can be difficult to provide. ***INSIDE OF ME*** is a theme which can be developed later in the year or in grade 2 when children already have a sound knowledge of their external bodies.
Children are usually fascinated by bones and this may be a good place to start. Try some of the following strategies to provide concrete experiences for developing a theme on ***BONES:***

➢ To provide an awareness or reinforce an awareness of the inside and outside of the body, the teacher can fill a garbage bag with some items: a wind up alarm clock, rubber balls, sticks, a book and some grapes in a small plastic bag.

**Drape the bag over a chair in such a way that the outlines of some of the objects inside are visible. Invite the children to gather round the bag and feel it. After discussing what can be heard and felt in the bag, place a child on the chair and look and feel knuckles, muscles, small visible veins.**

**The children find out that your skin covers the inside of your body. You have a heart, blood vessels, bones and muscles inside your body. The bones form a framework for the body. Otherwise, we would be lying around like the plastic bag.**

➢ Look at fish bones and chicken bones. (Bones should be sterilised before children handle them.

- A sense of time and history can be created by introducing children to fossils and dinosaurs now.
- Children can make their own fossils by makings hand and foot prints in plaster of paris. Extend this activity by going on an outing for a prints - hunt. Look for animal and birdprints and make casts of these.

**Program Organiser 2:** My skin
**Learning Areas:**

**Communication, literacy and Language learning**
Vocabulary: skin, sweat,
hair, fingerprints, protect, camouflage,
wool, pelts, fur, feathers , shells, scales
rough, smooth, soft, hard,
prickly, sunburn, wet burn,
dry burn; pollution Textures: rough, smooth, scaly, horny, soft, hard etc.
Look at pictures and discuss,
read and tell stories, draw pictures
write sentences and sing songs

**Natural sciences**
I have a skin, animals have skins: wool, hair, pelts, scales, fur, feathers. Water has a skin; Observe, compare, predict, experiment, classify, infer around skins - their abilities to absorb/repel water, camouflage Interdependence with animals - conservation - not killing animals for skins. Go on an outing to: a pond (frogs, tadpoles, fish, snails, ducks - compare skins & skin coverings) Think of other possible outings

My skin

**Numeracy and mathematics**
Classify according to type of skin;
making a graph to communicate
findings; count shells of different
colours and sizes; match skin
to a person, animal, texture.
Technology: Find products made
from skins - (clothes, music instruments,
dusters) Knit or weave a product using wool

**Life Orientation**
A healthy lifestyle - caring for my skin/hair, the skins, hair of the animals in my care - cleaning and protecting from the sun,
Pollution

The Art & Culture

**Music & Movement**
Songs about the animals where we
referred to skin: Hickety tickety My Black Hen;
Tipper Tap
Moving like the animals we referred to

**Art**
Painting with feathers
Collage with wool
etc.

**Activities to use in the program to promote specific outcomes**

**Programme organiser**

**My skin**

**Intended specific outcomes with this activity**

- Children will appreciate the function of a skin
- Children will know that there is a reason why animals have different skin colours
- Children will understand that camouflage helps, protects animals
- Understanding the value of colour in nature and in the manmade environment
- Be able to use colour for communication and protection
- We must care for and protect our skins

## Activities

Encouraging children to express their interests and discoveries using art, music, dance, movement, creative play experiences and storytelling are ways to support and extend environmental learning (Dighe).

### ① Discovery Activities

**Location/venue**: The school yard

**Apparatus and: Method for a variety of Camouflage and colour activities**

(I) Pieces of coloured wool. Ask children to hang pieces of coloured wool around the playground and in trees. Which can they see straight away? Which is difficult to see? Make a graph to illustrate the results.

(ii) Collect a set of boxes, all the same shape and size. The children can paint each one a different colour. Let two of the four children working in a group go out and put them in various places. The others should go out and find them. Which boxes are easily seen? If they are moved to different places does it make a difference, e.g. the green box on the green grass and the brown box on the ground. Does it make a difference if the boxes have graded shading or have patterns on them (compare with birds, snakes, giraffe and leopard - draw brightly a coloured giraffe (red), and lions (purple) and see how they stand out against the grass, and trees? Go on an outing to the zoo and compare the colours of animals to their surroundings.

(iii) Look at pictures of textures, (toads look like lumps of earth, clay), and shape imitations (stick insects look like twigs). giraffe, leopard

(iv) Hiding animals.

(v) Investigate make-up, war paint and animal courting colours. Which colours are used in this way? How do animals use white as a signal, and how do they use colours to communicate? Do we also use colours to communicate? Compare traffic signs. Children can make a group picture and make their own traffic signs.

(vi) Look at variations of colour in a family of animals (birds). Why are males bright, females dull, and the young dark except for their mouths.

(vii) Develop life skills: Could colours protect us? Does it make a difference if we wear light or dark colours in the sun? Which colours should we wear at night.? Why does the firefighter wear certain colours?

(viii) Make a rainbow by securing a mirror at an angle in a glass bowl with presstik or a heavy stone. Fill the bowl with water and place it in the sun so that the light is reflected through the water to form a rainbow against the wall. The children can paint rainbow pictures. With the colours of the rainbow.

(ix) Matching game 1: My skin can make prints which are only mine. Children at a table can make their finger prints on two separate cards. These cards are then mixed and they then try to find the match to their finger print.

(x) Matching game 2: Make pairs of squares of different textures of skins and products; wool, leather, feathers, coarsely and smooth knitted and crocheted wool. Children play the game as partners - one partners eyes are covered and he/she must make the match by feeling the textures.

**② Art Activities**

- Painting with feathers
- Making thumb print pictures
- Patterning: Cut squares, triangles and circles from skins or skin products and make a pattern collage. Provide empty shirt boxes and alcolyn glue and glue brushes. Sometimes provide a pattern to copy, to extend or to create.
- Weave with wool; knit on cotton reel spools

**③ Collect stories, songs and rhymes to fit in with the program organiser:**

Wilson (1994) points out that we should choose *Pro-nature* books and stories to share with young children. Pro-nature books are those that present positive and realistic messages about nature versus messages that are negative or false. Children's books that present wild animals as tame or as cartoon-like characters are not considered pro-nature, nor are stories that present certain animals as mean, ugly creatures.

- Stories:
Alexander's Outing - ducks (Allen); What Made Tiddalik Laugh - frog (Troughton); The Mixed-Up Chameleon (Eric Carle),
Chameleon's clever trick (Holleman & Pooler); Tikki in Trouble [Tikki encounters birds - Hoopoe, Marabou stork; and animals - Zebra, Impala, snake] (Phiri). Tara and the go away bird [Wood Hoopoe & Grey Loerie] (Phiri).
- **Songs:**
Six Little Ducks; Five Little monkeys; The Prehistoric Animal Brigade; Fishing; One Elephant (Okki - Tokki - Unga); I Can Sing A Rainbow, Snail and Mouse (Schonstein).
- **Speech Rhyme** (language & music)

◆ **Hickety pickety my black hen**

> **Hickety pickety my black hen**
> **Hickety pickety**
> **My black hen,**
> **She lays eggs**
> **For gentlemen**
> **Sometimes nine**
> **And sometimes ten,**
> **Hickety pickety**
> **My black hen.**

- Chant the rhyme a few times and encourage children to join in the first and last two lines.
- Bring out the consonants - ck, p. t. (language). Clap the beat quietly as you chant.
- Add variety by pausing after the word *nine* and either clapping nine times or dropping nine "eggs" (beads) into a tin (mathematics).

◆ **Tipper tipper tap**
(Music and movement)

**Tipper tipper tap**

**Tipper tipper tap**
**First a hole, then a crack,**
**Then a glimpse of feathers in a squirming back.**

**Chirpy chirpy cheep**
**Pipes a busy little beak,**
**Then a chick pops out and collapses in a heap.**

**Flipper flipper flop,**
**Like a small, damp mop,**
**Our chicken goes exploring with a wriggle and a hop.**

**Fluffy and dry,**
**And not a bit shy,**
**Our new-born chick blinks a beady eye.**

V Clark

Mime the actions in the first line of each stanza only. Suggestions will follow for percussion accompaniment.

Stanza 1
- Mime the action of the pecking chicken inside it's shell.
- Tap the rhythm of the words in the first line on a woodblock.

Stanza 2
- With the fingers and thumb of one hand, make a beak and mime the opening and shutting of a beak.
- Shake the rhythm of the first line with jingle bells.

Stanza 3
- Move the elbows of both hands in imitation to small wings.
- Flap a pair of clappers to the rhythm of the first line words.

Stanza 4
- With both hands make a round shape suggestive of a fluffy chicken.
- Wriggle fingertips slightly to give the impression of fluffiness.
- Give one gentle tap of the cymbal on the word Fluffy.

**MORE MOVEMENT & MUSIC IDEAS**

- Mime quick tapping movements of the beak with various parts of the body. Curl up small, begin to wriggle and squirm, then at a given signal - suddenly hatch out and collapse in an extended shape. Stretch one limb at a time , explore the surrounding space. Practice walking, as though for the first time.

- Use an instrument to indicate when the chickens should run and when they should stop.

- Listen to "Hatching chicks" from *Pictures at an Exhibition* by Mussorgsky.

It is important that the children should have an experience with a live chicken first - to look at it and to touch it and to watch it's motions.

✣ GAMES

- Domino game with different textures
- Follow the texture - Mark out a trail where children need to follow the trail barefoot by means of textures
- Maths Game on Snail's shell - counting
- Can you copy this pattern (with textures - Maths - Patterning)

### ⑤ Creative Play Experiences

It is crucial that early childhood educators/practitioners provide long periods of uninterrupted time for children within early childhood settings so that each child acquires knowledge, skills and positive attitudes to play while:

- exploring materials from the natural and manmade environment
- discovering and investigating spaces within the natural environment
- observing and interacting with people who positively guide behaviour in reference to the natural environment

It is only through spending long periods of time playing that the child becomes familiar with the materials, play spaces of the environment and with the messages that people are putting forward with reference to the natural environment.

Provide opportunities to:

- play alone (solitary play)
- play alongside another child (parallel play)
- play in a small group (small group play)

**Demonstrating an outcome**:

For the young child to realise that his skin is an important valued organ and needs to be protected and cared for by cleaning it and protecting it from the sun; by playing in the shade; wearing a hat and wearing protective clothing means that this child has over time acquired the important knowledge, skills and attitudes to act in this way.

### Conclusion

In conclusion the adult/practitioner should model interest in and caring for the environment. The success of Environmental Education with the young child depends, to a large extent, on the practitioner's own interest and enthusiasm.

> "If a child is to keep alive, his inborn sense of wonder ... he needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement and mystery of the world we live in" (Carson in Wilson 1995:9).

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# The Contribution of Environmental Education to Sustainable Development.

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Environmental education aims at supplementing knowledge, develops critical thinking and makes students aware of environmental issues and problems. It operates outside the stereotype framework of the educational system allowing students to create, to contribute and to discover new areas of ability as well as to further complete their personalities.

Thus they get sensitized ,they study, they investigate and they are alerted to their immediate and not so immediate surroundings.

Today a complete format for ever developing environmental education with a target of sustainable development would require a school that follows an European or International environmental network of schools. From within this network it would seek to co-create and develop a program covering a common subject, the exchange of students and teachers, would alert and inform the public all over the world in a structured manner on environmental issues and problems.

Sustainability is a general principle to be implemented in all areas of social life and as such it involves a process of comprehensive transition which is based on the dissemination of information and awareness raising about the environment.
In this context a method was developed by DG XIII-D "Innovation" program which originally was used for identifying future scenarios for sustainable urban living.
The method is called European Awareness Scenario Workshops EASW.
According to its application, the EASW method could be a tool for:
- information and learning,
- understanding and participation in the decision making process,
- common planning for the future
- identifying responsibilities and priorities

or just any combination of the above.

One of its applications was in a one year environmental education project between Danish, French and Greek pupils, members of a European Network of Environmental Education.

Two ecological Workshops took place having as subject: "The Ideal Home of 2016 and Sustainable Development" and 93 pupils took part.
The workshops' targets were multiple:
1) The students were to perceive the relationship and applications between the four words: Vision - Plan - Action - Consequences.
2) To consider the Environmental consequences of every day life. (for example: Life at Home).
3) To learn how to express certain proposition aspects of topics that concern the students (poster preparation).
4) To evaluate and choose from the various propositions.
5) To cooperate with others and express different points of view.

The workshops were completed in 2 phases. In the first phase (Phase A: A Vision of the House) the participants were divided into 3 groups under the titles:
1. Apartment in the city, 2. Apartment in the suburbs and 3. Single residence.
In the second phase (Phase B) the participants were re-divided into 4 groups on the topics:
1.Energy, 2.Water, 3.Garbage and 4. Atmospheric Pollution.

**INSTRUCTIONS FOR PHASE A**

- The participating members of each group discuss their own insight about "The Ideal Home of 2016" and

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they describe its basic characteristics.

- Each group is free to choose any kind of home type as ideal (apartment, single family house etc.) independently of its group title, for example, the "Apartment in the city" group could consider a single family house on 2 levels and a garden, as the ideal home of 2016.

- Each group within a given time, must prepare a poster which should describe the 6 basic characteristics of the ideal house of 2016. One member of each group presents the poster briefly. The basic characteristics proposed by all the groups are then summarised.

The general results of the 3 Groups were:

1) Modern equipment.
2) Large space for every person.
3) Usage of solar energy for heating and hot water (solar collectors).
4) Buildings with 4 or 5 plans and gardens.
5) Wind energy
6) The installation of an automatic program for energy consumption control is essential.
7) Transportation with electric and solar vehicles.
8) Pool.
9) A Parking space for every car.
10) Garden with trees and balconies vegetables or green areas on balconies.
11) Solar heating.
12) A recycling system for organic waste.
13) Work at home and everything should be controlled by a computer.
14) Free time for leisure.
15) The use of solar passive systems and insulation material, both based on bioclimatic architecture.
16) Recycle construction and home materials.

**INSTRUCTIONS FOR PHASE B**

In phase B the participants are divided into four thematic groups ("energy", "water", "atmoshperic pollution", "waste disposal") of 7-12 people. Its thematic group examines the propositions for housing that arose from phase A, from the point of view of its topic.

The goal of each thematic group is to formulate ideas about the most adequate application of the visions of housing for 2016, keeping in mind the protection of the city environment. For example, if we want our "ideal home" to have a garden, how can we recycle rain water to water it.

Within the given time period each group formulates five ideas and creates a poster. These ideas are presented to the others by a member of each group.

Finally the participants vote for the ideas that have been presented. Everyone can vote up to five ideas (from the same or different posters) with the following restrictions:

1. Its not allowed to vote the ideas of their own group's poster.
2. Only one vote can be cast for each idea.

The results of the voting are presented by the coordinators of the Workshop to the others. We hope that, from the results and the priorities which come up from the Workshop, there will be certain ideas for future plans that will be announced to the competent authorities and actors.

We also hope that the imagination of young people will contribute positively to the spreading and comprehension of the problems of sustainable development and will even promote new solutions.

The results of the 4 groups of phase B were:

Group A: Energy

1) Renewable sources of energy for the production of electricity, hot water.

- Windmill and solar cells on the roof.
- The state will fund research in renewable sources.
- Programs to educate the people.
- Give information and encourage people to use them.
- Taxes for people who pollute.

14 points

2) Computer for organising energy resourcing (Turning off the lights when nobody is in the room, Turning on the heat when we enter the house).

3 points

3) Bioclimatic architecture (Building based on architecture with passive solar system).
18 points
4) Recycling of water (garden, toilet etc.)
* recycling organic material for biogass (plants)
5 points
5) NO CARS! - Better public transportation.
* More punctual buses.
* More trains and cheaper bikes.
* Underground electrical transportation.
20 points

Group B. Water
1) Human Factor (information, campaigns, green taxes, "rewards") 8 points
2) Industrial equipment:
toilets (less or no water).
a) for houses b) for apartments. 9 points
3) Modern equipment
* pool (filters, public pools, usage of rain and sea water).
* Garden (timing limits, usage of rain water, luxury: golf-course!)
* 4-5 floor buildings: usage of pumps.
20 points

Group C: Garbage
I. The recycling of garbage
1. Each house must have 5 different dustbins. Will be binned separately. Glass, paper, aluminium, plastic and raw materials.
In each neighbourhood there should be many special dustbins where citizens can throw recyclable material.
12 points
2. From raw materials we can produce biomass and save a lot of energy and money. Also the problem of where to bury garbage may be solved to a large extent.
9 points
II. How to reduce our production of garbage
1. The government must have a bigger budget for recycling.
The Media and schools must help to change attitudes to the accumulation of garbage.
Governmental restriction must be made to make the industry use less packaging materials.
9 points
2. "Bring our own bags for shopping".
Automatic machines for coffee and corn flakes etc. so no packaging needed.
8 points

Group D: Atmospheric Pollution
1) Change of mentality: (transportation)
* Information to citizens through schools, television, advertising... to change the mentality.
* Ecological consciousness through education.
16 points
2) Transportation: buses, bikes, trains.
* More than one person in every car (no tolls on highways).
* Cars using solar or electric energy (smaller cars) (less cars).
* Better technology for cars in general.
* Large investments in public transportation.
8 points
3) New implementations for working positions. Increase of Green Ideas.
* - Each factory or industry should have a responsible person to measure the pollution, produced by the factory (lower unemployment).
* - Limits on the amount of pollution each factory produces should be set. (Fines if not adhered to).
13 points
4) Information and new ideas about production without (with less) pollution. 4 points

**THE FINAL RESULTS OF THE VOTING AFTER THE PRESENTATION OF ALL THE (4) POSTERS WERE:**

48 points: Transportation (Transportation with solar and electric vehicles for saving energy and diminishing atmospheric pollution.)

38 points: Application of Bioclimatic Architecture and usage of modern equipment in habitations (homes, buildings, residences....)

28 points: Better information to the citizens (public) with campaigns, commercial television spots, in order to change their mentality and to respect the environment more.

After the ecological workshops, two round table discussions followed, under the heading "The Energy Crisis and how Environmental Education through her Environmental Projects can Propose Solutions".

EAWS proved to be a most valuable tool for environmental education, helping the pupils to get involved with environmental problems. It helps them to cooperate with other pupils, think, discuss and propose solutions for various environmental problems, that will contribute to a sustainable future.

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# South Africa and the environmental challenge

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> *"Environmental concern can unite South Africa beyond social, political and economic barriers. In addition to the education crisis, the housing crisis, the job crisis and a host of other problems, the new democracy will have to face the environmental legacy left by the policy of apartheid... where the poorest communities are often the victims of the government's weak environmental policies..."*

Nelson Mandela spoke these words in 1993. A year later, in 1994, after 27 years in prison, he was elected President of the National Unity Government of the Republic of South Africa.

## INTRODUCTION

South Africa is a unique country, heir to varied and impressive natural resources, and holds one of the worldÆs six plant kingdoms inside its borders. Its biological diversity (an immense variety of species, ecosystems and ecological processes) is a fantastic asset both nationally and internationally. Its huge deposits of gold and diamonds (South Africa is the worldÆs leading gold producer and fifth-largest diamond producer) and other valuable minerals and its vast coal beds are the reason for the country's strong industrial development, with first-rate financial and physical infrastructures that coexist with a third-world sector embarrassingly maintained and fed by the policy of apartheid. This makes it hard to classify South Africa either in the developed nations category or with the developing nations, although its major environmental challenges belong to both: general pollution and massive population growth, deforestation, soil erosion, poverty, and so forth.

As Kevin Gardener of the Morgan Stanley Business Bank stated, *"There is no medium-sized economy in the world except South Africa, where a modern, vibrant private sector with first-rate financial and physical infrastructures coexists with a third-world sector thirsting for prosperity."*

South Africa needs development and conservation at the same time. Genuine economic development may be considered to be the process whereby resources are used to enhance the well-being of present and future generations of human beings by means of a careful balance between development and conservation. That leads us to the concept of ôsustainable development policy,ö which basically has two components:

Economic development, seen as the management of man-made capital and environmental capital to better satisfy human needs and aspirations.

Sustainability, seen as the management of man-made and environmental capital for the purpose of maintaining the environmentÆs ability to satisfy present and future generations.

## THE RECONSTRUCTION AND DEVELOPMENT PROGRAM (RDP) AND SUSTAINABLE DEVELOPMENT

The Introduction to Agenda 21, the framework for global action for socially, economically and environmentally sustainable development which was approved by the UNCED (United Nations Conference on Environment and Development) held in Rio de Janeiro in 1992 states as follows:

*"The fundamental aspect of Agenda 21 is the idea that humanity stands at a turning point in its history. We can continue ongoing policies, which perpetrate the economic differences between and within countries, augment poverty, hunger, illiteracy all over the world and cause the continued spoilage of the ecosystems on which we depend to sustain life on Earth. "*

And it continues,

*"Or else we can change course, raising the standards of living for the needy. We can regulate and better protect ecosystems and seek a more prosperous future for us all. In the Preamble to Agenda 21, the Conference's Secretary General affirms that no nation can reach these objectives on its own. He indicates that together we can do it, in a world alliance for sustainable development."*

Despite its so many years' international isolation and its exclusion from the Rio Earth Summit, the Republic of South Africa has striven to follow international environmental philosophy and trends.

The "Reconstruction and Development Program" (RDP) put into practice by the National Unity Government aims, in its own words, *"to turn the country into a flourishing, modern, democratic society that can face the challenges of the twenty-first century*... according to the parameters of the principle of sustainable development. *"Democratic government must ensure that all present and future South African citizens enjoy the right to a decent quality of life through sustainable resource use. Therefore, the government must work on achieving a healthy, safe lifestyle and occupational environment and making environmental decisions through a participative process, enabling communities to manage their own environment.*

Pallo Jordan, Minister of Environmental Affairs and Tourism, and Vice Minister Peter Mokaba, in the preface to the Green Paper of Environmental Policy, declare:

*One basic goal in the Reconstruction and Development Program is to achieve sustainable development. This evinces our desire to ensure that today's development aspires to improving the quality of life of the people of our nation, without having a negative effect on the option of future generations of South Africans. The environmental protection clauses are sacred in our new Constitution. Sustainable development requires participation, fairness and sustainable use of natural resources. That includes protecting the environment in which we live and work. That is why it is important to make sure development management is handled according to the recommended principles outlined in Agenda 21, the United Nations' program for sustainable global development. ...The participation of South Africans, at all levels of government, industry, labor unions, collective organizations and NGO's, is vital for the effective development of environmental policy and its implementation.*

South Africa's biggest challenge right now, its *second miracle* (the first being its political transformation), is, then, to accomplish the fast economic growth that the country needs (53% of its population lives below the poverty level) while maintaining the capacity of its capital; that is, without causing serious and irreversible environmental problems.

The leading environmental and economic tasks it must shoulder in order to reach these goals may be summed up as follows:

- Control over community resource use;
- Adoption of an effective population control policy;
- Development of the necessary tools to achieve fair distribution of income and well-being;
- Finding of the highest levels of agricultural production that can sustain resource renewal;
- Calculation of the optimum rates of reduction for nonrenewable resources.

So, the 1992 Rio de Janeiro Earth Summit firmly cemented the concept of sustainable development into the global agenda; since then the business world has not slackened in its search for creative solutions to conciliate its needs with those of the environment. For most big world corporations, the art of balancing what has come to be known as *the three E's*, energy, environment and economy, has become the key strategic target.

As indicated above, South Africa's main challenge in the wake of its political transformation is without a doubt the challenge of economic transformation. President Mandela and Vice President Mbeki have appealed to the country's business leaders to contribute to the securing of this goal within an economic vision that couples growth with fairness and helps all South Africans lead a better life.

Among the activities of big business in this field, I would like to draw attention to that of an important multinational, the Anglo American Corporation. Most companies and subsidiaries belonging to this corporation are moving toward a common framework from which they can manage environmental impact while creating business opportunities at the same time. This framework includes the development of *Integrated Environmental Management Systems*, the definition of standards, functions and responsibilities, a formally-defined policy, and plans for action that meet the special circumstances of each of its companies. The Corporation's view is that the environment is a strategic business challenge that involves substantial costs and must be managed effectively, using the same principles that make for commercial success in any other field, requiring advanced planning, efficiency, and optimum resource use.

In many of its industrial companies including its mining firms, special committees of specialists in different scientific and technical disciplines related with environmental management have been put together. These committees, whose focus is basically professional, are advised and aided by organizations such as the *Ecologist Group* and *Envirolink*, the multidisciplinary team comprised of Corporation technical experts and researchers, whose goal is to help Corporation members and any other companies needing help to handle their environmental problems through hard-hitting action such as environmental impact evaluation, water management and pollution control, mine shutdown, risk analysis, waste elimination, audits, environmental education, and so on.

Ever since 1990, an important mechanism for sharing experiences and debating new environmental management policies in the Corporation has been the *Environmental Workshop*, which meets every two years and works under the direction of Gavin Relly, Anglo's former Chairman.

Corporation representatives and representatives from its mining and industrial companies also actively participate in a growing number of executive and advisory boards for local, national and international environmental policy, creating important feedback inside the policymaking process.

For instance, the Anglo American Corporation is a member of the *Industrial Environmental Forum of South Africa* (IEF), created in 1990, to which all the foremost South African companies belong. Its philosophy is based on the idea that economic development is inseparable from sustainable use of the environment, and its objectives are essentially to boost environmental awareness, to promote the best experiences and to participate in the far-reaching policy debate.

The IEF attends the meetings of the steering committee of the Department of Environmental Affairs and Tourism, making significant contributions to the new government's environmental policy. The IEF has woven an African network of environmental businesses and associates by annexing similar associations in Ghana and Mozambique, apart from the associations already existing in Namibia and Botswana.

## SOCIOPOLITICAL FACTORS IN THE REPUBLIC OF SOUTH AFRICA

From the sociopolitical point of view, while enjoying a climate of apparent stability, the Republic of South Africa is undergoing a delicate and deep-reaching process of democratic transformation as it strives to shed three hundred years of the colonial system and apartheid; a kind of ômiracle,ö as mentioned above, in one of the most unequal societies there are, one without precedent in the world scene, and whose success depends on a true national reconciliation (Officially, this reconciliation is being carried out through the "Truth and Reconciliation Commission" created by Parliamentary Act and included in the 1993 Constitution. The Truth and Reconciliation Commission started work in 1995, chaired by Anglican Archbishop Desmond Tutu) and the thorny challenge of finding its own path to the twenty-first century within the unforeseeable context of the African continent.

The growing interest being shown in environmental issues in South Africa thus coincides with this period of political and social transition, the most important period of South Africa's recent history, which consequently opens up a vast array of uncertainties at the same time as it presents a unique possibility to unify different points of view and to develop management systems endowed with the broadest possible support and legitimacy.

Some important questions to consider in this period are:

(i)......Population and Resources

Dizzying population growth is often considered the number-one challenge for sustainable development and the environment. As such it is expressed by the President's Council, which holds that *rapid population growth in South Africa is inarguably the environment's biggest challenge*.

The relationship between population and resources is complex and must be dealt with carefully.

From the international point of view, population was the overriding issue of the 60's and 70's, and the "World Health Organization" and other major organizations launched population programs. However, the charge leveled against such programs was that they exhibited an underlying class prejudice: in essence, rich, developed nations sought to solve their population/resource problems elsewhere while trying unsuccessfully to redirect their excessive resource consumption and waste production. In South Africa, similar criticism has been aimed at population programs, and that should cause no surprise, given the country's recent history and its manipulation, especially where access to a natural environmental resource as basic as land is concerned.

Political and social consensus on population management is certainly possible and undeniably desirable, although to reach it the divergent existing priorities must be taken into account; for some, the priority question involves management of resource use and environmental impact; for others, it is to improve the quality of life and working conditions, plus access to resources and the systems that determine resource distribution. From here it can be argued, as Huntley, Siegfried and Sunter do in their book South African Environments into the 21st Century (1989), that representative democracy is the basis for healthy environmental management.

(ii)......Land Distribution and Management

Of all the resource issues environmental managers face in South Africa, the land issue is probably the most heavily-laden with emotional and political weight. The latest environmental policy statements display great unanimity about unsustainable land use and soil degradation, but they differ widely on the importance of historical conflicts stemming from land.

Politicized land is a reality in South Africa, with heavy pressure from the black population for land to be redistributed, coupled with some attempts at resistance on the part of whites. Statistics illustrating the sharp racial imbalance in South African land distribution are widely known, and the people now in charge of land management are struggling to reach a broad consensus that will decidedly contribute to land redistribution and a debate on land reform.

(iii)......Urban Development and Cities

According to "Population Trends" (Urban Debate 2010, Urban Foundation, 1990), most South Africans (approximately 57% in 1985) already live in urban areas, and this proportion will swell quickly in the following decades until the year 2010. Urban development will be particularly significant among the black population, which is expected to live in an urban environment in a proportion rising from 53% in 1985 to 69% in 2010. In absolute terms, this means that the black population in urban areas of South Africa will increase by close to 20 million between the years 1985 and 2010.

The growing tendency of South African society toward the eminently urban is not mirrored by the attention paid to the urban question by the different environmental management institutions and organizations. The *Department of Environmental Affairs and Tourism*, for instance, has only one subdirectorate dealing with urban issues.

Two fundamental outlooks are considered to exist in the city/environment binomial. The first is that which considers the roles and impacts of urban areas on the environment, and the second is that which considers urban areas *as* environment. As far as the first focus is concerned, political reports from both the PresidentÆs Council and the ANC (African National Congress) concentrate on the environmental impact of industrial and urban activities, trying to manage and regulate them, although the ANC focuses more heavily on the two questions that have had the greatest impact on black communities in recent years, air pollution and toxic waste.

The impact-*on*-the-environment view also encompasses the politically hot question of identifying, grouping and developing land for low-income urban housing. Problems such as this in a country where the ranks of the homeless grow and grow can only be solved by a sociopolitical approach: land use management in cities (or wherever) must have a political side, and environmental managers have to see beyond plans and processes and try to ease the tension between the different positions.

In the outlook on cities *as* environment, the problems of overpopulation, inadequate housing, poor working conditions, faulty urban services, and so on lead to the center of the environmental policy debate and the relationship between apartheid and the environment of poverty, whose transformation environmental managers will have to face as South Africa forges onward in its political and democratic transition.

Influential development agencies such as the World Bank have stressed the importance of urban productivity as a *conditio sine qua* non for national economic development and the achievement of well-being. Environments of poverty constitute in the best of cases a basic impediment to such productivity.

(iv)....Management Institutions

It has been argued that one of the key challenges in the environmental management of developing countries is their lack of institutional capacity to undertake this complex task and the absence of the necessary government machinery to enforce environmental regulations and laws, which in some cases also include a lack of political determination to confront powerful vested interests.

In order to counter these proven shortcomings, strong international support has been created for the principle of spreading this environmental "load" around as far as possible. The importance that UNCED organizers at the Rio Earth Summit pinned to citizen and NGOs participation in order to ensure compliance with the principle stemming from the Summit was thus highly significant.

In South Africa, there seems to exist if not perfect at least harmonious and effective cooperation between the State, civil society (NGOÆs and other civil associations) and the private business sector. What are known as rainbow alliances have also been created to take on specific environmental risks, although such coalitions are generally short-lived.

From the governmental side, the *Department of Environmental Affairs* and Tourism, which we will discuss later, has among its directorates general one that is in fact named ôEnvironmental Managementö.

## ENVIRONMENTAL POLICY AND ADMINISTRATION

Current environmental policy and administration in South Africa are the result of a historic process whose decisive latest steps are being taken right now, with the implementation of the new Constitution.

### The New Constitution

The new Constitution of the Republic of South Africa, which was approved by the Constitutional Assembly on May 8, 1996, and took effect February 4, 1997, put an end to the provisional nature of the "interim Constitution" or 1993 Kenptom Park Constitution, under which in 1994 the first multiethnic elections were held, which gave the majority to the ANC (African National Congress) and allowed Nelson Mandela to be elected President of the Nation.

The new South African Constitution stresses the importance of conservation and recognizes the right of each person to an environment that is not harmful to health and well-being. This clause, which already appeared in the interim Constitution, has now been reinforced by the guaranty of the right

"...to have a protected environment, for the benefit of present and future generations, through reasonable legislative measures and other measures that
(i) provide for pollution and economic degradation;
(ii) promote conservation; and
(iii) ensure ecologically sustainable development and use of natural resources, while promoting justifiable social and economic development.ô

This clause not only calls for the State to take positive steps to protect the environment, but authorizes the courts to take environmental and conservationist interest into account. The Constitution also recognizes the right to administrative action, which is legitimate, reasonable and fair from the procedural point of view, and the right to receive in writing the reasons for administrative action adversely affecting citizens' rights. Environmental rights are thus protected by the responsibility borne by the State and other administrative agencies. The right to information likewise ensures fairer public debate on this kind of issue.

This Constitution is very important for "the new South Africa," because at last, under section 36, its citizensÆ rights can only be restricted to the limit of what is reasonable and justifiable in an open, democratic society based upon human dignity, equality and liberty.

From the political standpoint, President Nelson Mandela, referring to the weighty political and ethical agenda that South Africa has to deal with in order to make democracy acquire its full meaning, has pointed out a significant link between democracy and environment:

*"At the head of the agenda of the Government Reconstruction and Development Program stand the people... The RDP sets before itself the task of satisfying the basic needs of everyone forming South African society, especially the poorest, by developing human resources, building up the economy and democratizing the State and society. The challenges we have to face are enormous... With the establishment of a democratic government, the conditions for successfully implementing integrated environmental management policies are promising."*

**Environmental and Conservation Policy**

The need for a national environmental policy and conservation strategy stem from different social strata's growing awareness of how urgent it is properly to manage nonrenewable natural resources, which depend on humanity for their survival. The publication of the "World Conservation Strategy" in 1980 and "Caring for the Earth: A Strategy for Sustainable Living" in 1991 by the IUCN (World Conservation Union) with the support of the WWF (World Wide Fund for Nature) and UNEP (United Nations Environment Program) referred to above set off a chain reaction in the environmental movement.

"World Conservation Strategy" dealt out a broad array of land use options not limited to protecting nature. At the same time, it attempted to provide an ideal profile of principles and rules for sustainable natural resource use. That same year, the South African government published a White Paper announcing a change of attitude with respect to the environmental impact of human action. Its purpose, as declared in the paper, was to find an ideal midpoint between dynamic development and the vital demands of environmental conservation.

Nevertheless, the first real try at developing a national environmental conservation policy and strategy was made by the *Wildlife Society of Southern Africa* and printed in 1981. Basically, this document proposed broad conservationist and environmental objectives and the necessary principles and policies for accomplishing them. One important date in the development of this policy was 1982, when the aforementioned statutory *Council for the Environment* was established (which drew up proposals of environmental administration policy and strategic directives), the "Environment Conservation Act' was enacted, and two Planning Committee reports, "Nature Conservation in South Africa" and "Priorities Between Conservation and Development," were published.

*The Council for the Environment's* publication of the document entitled "Approach to a National Policy and Strategy for South Africa" in 1989 was another step forward in the now-uninterrupted process. The document has two parts: the first outlines its approach to environmental policy and the conceptual reference framework on which its goals and environmental policy are based; the second describes individual environmental components and resources, the leading conservation objectives for management, and the strategies for reaching those objectives. This preliminary document was published and subjected to evaluation. Its final recommendations on a national environmental policy and strategy were submitted to the Minister of Environmental Affairs and constituted the first environmental policy outline.

The White Paper on an Environmental Management System was printed in 1993.

The *Council for Scientific & Industrial Research* (CSIR), fulfilling its commission from the *Department of Environmental Affairs*, also drew up three important reports:

"First Report on the Situation of Waste Management & Pollution Control in South Africa," 1991;
"Hazardous Waste in South Africa," 1992; and
"South Africa's National Report to the U.N. Conference on Environment & Development," 1992. This report served as the basis for the establishment that same year of the *Foundation for Sustainable Development in South Africa*.

South Africa is currently implementing its national environmental policy through a consulting process known as the " National Consultation on Environmental Policy Process" (CONNEPP), whose primary objective is to develop a broad framework of policy and strategy allowing for sustainable management of the environment in South Africa. This process has given forth with the publication in October, 1996, of the Green Paper on an Environmental Policy for South Africa and the White Paper on Environmental Management Policy for South Africa in July of 1997.

The *White Paper*, the latest South African environmental legislation, holds, as its name indicates, the gist of the government's environmental management policy while it also describes the context in which the policy is being implemented. Its sphere of application includes all government institutions and all activities having environmental impact.

Under this policy, in addition to defining sustainable development as a combination of social, economic and environmental factors and as the best approximation to resource management and use in South Africa, the government undertakes to enforce all environmental rights included in the nationÆs new Constitution.

Its goals aim at ensuring that South Africa's future development is ecologically sustainable and fair and takes special pains to conserve its enormous natural resources and rich biodiversity. These goals are:

- Creation of an effective institutional framework and an integrated system of legislation.
- Sustainable resource use and environmental impact management.
- Wide-scope integrated planning guaranteeing that environmental considerations are actually integrated in the development of government policies and programs.
- Establishment of mechanisms and processes to ensure effective public participation in environmental government.
- Environmental training and education.
- Development and maintenance of mechanisms to increase access to environmental information and to ensure effective environmental information management.
- International cooperation on issues involving the environment.

Because of the importance given to environmental and conservation issues, the words of Vice Minister of Environmental Affairs and Tourism Peter R. Mokaba in the Preface to the White Paper prove highly significant:

*"In our country, we have come to realize that the democratization process and the establishment*

*of good government can only be guaranteed if they are based on a reasonable economic and socioeconomic framework that is environmentally sustainable. Fair access, ownership and control of renewable and nonrenewable natural resources by South Africans, black and white, poor and rich, men and women, are critical for our survival as a nation. Conservation and sustainable use of these environmental resources and their protection depend on a change in the behavior of all individuals, families and public and private institutions. These changes must affect the processes of resource tapping, space development, clean, appropriate production methods, waste minimization and pollution control strategies, in order to guarantee a better quality of life for all."*

**Administration**

The current constitutional system of the Republic of South Africa is represented by three levels of government:

- The central or national level, featuring the Parliament as the supreme legislative body and the central executive government's institutions;
- The regional level with nine provincial administrations; and
- The local level with local or town councils.

At the central or national level, the Minister of Environmental Affairs and Tourism is authorized nationwide to decide (or amend or reject) general policy to be applied concerning:

- protection of ecological processes, natural systems and natural beauty, as well as the preservation of biological diversity in its natural environment;
- encouragement of the sustainable use of species and ecosystems, and effective application and reuse of natural resources;
- protection of the environment against disturbance, spoilage, disfigurement, poisoning and destruction as a result of man-made structures, facilities, processes or products or human activities; and
- establishment, maintenance and improvement of the environment contributing to an acceptable quality of life for the inhabitants of the Republic of South Africa.

Furthermore, in mapping out this policy, the Minister must necessarily consult with:

(i)... Each minister entrusted with the administration of a law that, in its opinion, is related with an issue concerning the environment.
(ii)... The Minister of Finance.
(iii)... The authorities of each province.
(iv)... The Council for the Environment.

The Department of Environmental Affairs and Tourism

The *Department of Environmental Affairs and Tourism*, under the jurisdiction of the Minister of Environmental Affairs and Tourism and the Vice Minister, is the body in charge of mapping out environmental policy at the central or national level.

As stated in Environment. South Africa published by the Department in 1995, *"the Department's business is to initiate processes that will constantly transform society, in order to live and prosper in harmony with the environment."*

Its structure consists of six Directorates General:

Tourism
Sea Fisheries
Meteorology

<Environmental Education
Impact Management <Cultural Resource Management
Environmental Management——Sustainable Development——
Natural Environment <Research, Information & Control Systems
<Sustainable Development Management

Pollution Control
Administration

As it acknowledges that man and environment are indissolubly joined, one of the missions of the *Department of Environmental Affairs and Tourism* is to ensure fair, environmentally correct development through integrated sustainable use and wise environmental resource management.

Its objectives are:

- To maintain ecological processes and the systems that support life.
- To protect biological diversity.
- To develop an understanding of natural processes and phenomena.
- To manage the nation's cultural and historic heritage.
- To develop the appropriate technological and scientific expertise to provide reasonable advice for the management of the environment and natural resources.
- To establish rules and standards for:
    1. Use and transformation of the environment.
    2. Maintenance of a healthy, clean, attractive environment.

And its functions are:

- To map out and divulge environmental policy;
- To ensure that ecosystem fragility is taken into account in the management system and that resource use is allowed only within the limits of those ecosystems' natural reproductive capacity or load-bearing capacity;
- To shift such policies into specific action by public authorities;
- To control the scope of application of this policy, its effectiveness and its enforcement;
- To adapt policies when necessary and to ensure the cooperation of departments and officials.

Furthermore, pursuant to the 1997 White Paper on Environmental Management Policy for South Africa, to ensure that policy is in fact shifted into practice, the *Department of Environmental Affairs and Tourism*, as the government's leading agent for environmental management, must develop the ôNational Environmental Strategy and Action Plansö (NES&AP) specifying environmental strategies and action plans and setting objectives and deadlines.

The NES&AP will focus on and give priority to goals and objectives requiring action by the government and others within the next five to ten years. Priority criteria must take into account:

- Action ensuring a healthy working and housing environment.
- Protection of the environment for present and future generations through the achievement of environmentally-sustainable development.
- Aid to accomplish sufficient growth to cover basic needs.
- Achievement of full, integrated environmental management.

**Other Statutory Organizations**

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A number of statutory organizations under the Minister of Environmental Affairs and Tourism are also responsible at the national scope for environmental policy.

The *Council for the Environment*, as we have already explained, had its origin in a non-statutory advisory committee established in the early 70's known as the *South African Committee on Environmental Conservation* and was rechristened in 1975 with its current definitive name. The Council was reconstituted as a statutory body under the "Environmental Conservation Act" of 1982 and again in 1989 under the "Environmental Conservation Decree". The Council is basically an advisory body that the Minister consults with on any matter involving environmental policy and strategies.

The *Committee for Environmental Management* is the continuation and extension of the *National Committee for Nature Conservation* (Nakor), which, at its own initiative, has played a very important role in coordinating nature conservation over the last 15 years. The function of this Committee is twofold: first, to advise the Director General in environmental matters or any other matter involving activities that may affect environmental conservation, protection and use. Second, it is in charge of promoting effective coordination among the different state departments and other executive institutions related with environmental management.

Other organizations of this type include the *National Parks Board* (responsible for setting up and managing the national parks and one of the highest-ranked organizations in conservation management, which we shall discuss later), the *National Botanical Institute*, the *National Hiking Way Board* and the *Sea Fisheries Advisory Council*.

Other central governmental departments are also involved in the administration of conservation- and environment-related matters. Land use planning is the responsibility of the *Department of Regional and Land Affairs*, while soil and agricultural resource conservation fall under the jurisdiction of the *Department of Agriculture*. The *Department of Water Affairs* is responsible for managing water sources, while certain issues concerning water quality, radiation and air pollution are under the jurisdiction of the *Department of National Health and Population Development*. Responsibility for controlling oil pollution at sea is shared by two Departments, *Transport* and *Environmental Affairs*, while the Department of *National Education* and the *National Monuments Council* are responsible for the preservation of certain cultural and historic treasures and for environmental education. The *Department of Mineral and Energy Affairs* is concerned in the control of energy and mining.

The *Committee for Environmental Coordination* (CEC), as its name hints, fulfills an administrative function; it is the intergovernmental coordinator. Five working subcommittees have recently been created: Agenda 21 (sustainable development), Biodiversity (including CITES), Climate Change, Environmental Education, and Environmental Impact Management.

Since the late 80's when the process of returning administrative powers to the provinces began, although the central government still plays the most important role, many environmental functions have been transferred to the provincial administrations concerned. Under the Constitution of æ93, environmental affairs, as well as nature conservation except for national parks, botanical gardens and marine reserves, fall under the legislative and administrative power of the provinces.

## ENVIRONMENTAL EDUCATION

The environment cannot be discussed without referenced to education. Indeed, the reformulation of new systems of values, as so insistently spoken of, and the modification of attitudes and behavior are tasks that directly concern the educator, who must reshape personality or, one might say, stimulate each student to hold the best outlook toward oneself and reality.

Nature has become an emerging value that must be properly valued, or human life will be endangered. Education, which implies valuable, intentional and systematic learning and a perfective modification of knowledge, attitudes and behavior, must then (in its facet as environmental education) provide the groundwork for an appropriate, systematic fight against environmental spoilage and in favor of sustainable development. This must be done not only as an individual, isolated effort but also through the World Community by forming part of the Global Agenda, in a united front of solidarity and common interest.

Ignorance, poverty and overpopulation are some of the leading psychological, social and economic problems at the root of poor environmental management. In the quest for solutions, it has been argued that education, be it formal or informal, is one of the keys for developing optimum relationships between individuals and the environment, since only through education can understanding be broadened and skill development stimulated. So, education can constitute the basis for improving the quality of life in disadvantaged communities and successfully carrying out sustainable environmental management programs.

The strategy for introducing this educational movement in formal education in the Republic of South Africa was begun when the people involved in it decided that, apart from the important work done in the education field by government agencies, this type of education should also have a place in formal education. Thus, as a consequence of certain initiatives taken by *the Department of Environmental Affairs and Tourism and the EEASA* (Environmental Education Association of Southern Africa), a number of educators from the formal education sector met in 1993 to launch the process known as the "Environmental Education Policy Initiative" (EEPI).

The EEPI has been developing since then, involving a large number of people, including some members of the nonformal education sector, and organizing workshops in the different provinces to get the word out about the project. One such workshop held in Brits, Dikhololo, in August, 1993, was a major landmark in this process, since it managed to get the idea of including environmental education in formal education to be discussed by the leaders of the most important agencies concerned in the project. These agencies included all departments of education of the educational system at that time (a total of 17), members of the education sections of political parties, educational associations, members of progressive education movements such as the *National Education Coordinating Committee* (NECC), student associations such as the *Council of South African Students* (COSAS), university representatives and interested persons. The decision of this meeting was unanimous: the process should continue, and the already-existing committee should direct it.

After talks with the former *Department of National Education* and political parties such as the ANC, the committee managed to get education concerning the environment mentioned in the "Reconstruction and Development Program" (RDP) and in the ANC's 1994 paper on education, "Discussion Document on Education," and finally the 1995 White Paper on Education.

In short, it may be said that teaching involving conservation and the environment in South Africa in the field of formal education is currently in a decisive stage, where it is held to be an indisputable part of future curricula at all levels of education by the different committees in charge of curriculum design. Furthermore, the list of universities, schools and institutions teaching environmental education in South Africa is constantly on the rise.

In the nonformal education sector, environmental education centers are proliferating in South Africa, offering courses on the environment to businesses, institutions, schools interested in their programs, and especially local communities. For instance, thousands of Soweto teachers, children and young adults are participating in environmental education programs organized by the *National Environment Awareness Council* (NEAC). In the province of Mpumalanga, Ecolink, an environmental education NGO, is running important, broad-scope environmental education programs for the local population.

The stress laid by the government of the "new South Africa" on the necessary and urgent process of integrating local populations in environmental management makes environmental education, especially nonformal environmental education, one of the indispensable requisites for its success.

As regards governmental institutions, most governmental departments are involved to some degree in education on conservation and environmental problems, starting naturally with the *Department of Education*.

In the *Department of Environmental Affairs and Tourism*, Environmental Education is one of the subdirectorates under the Directorate General of Environmental Management. Through the EEPI, the DEAT provides hefty input into the development of the current educational system of the Republic of South Africa. As already stated, the purpose of this initiative is for education dealing with conservation and environmental problems in general to be properly included in its policy and the curricula of formal education. It also finances and forms part of the *National Steering Committee* that was set up for this purpose in 1996.

The Subdirectorate of Environmental Education of the *Department of Environmental Affairs and Tourism* supports national student organizations such as the *Congress of South African Students* (COSAS) and the *South African Student's Congress* (SASCO) financially and information-wise. These organizations are currently involved in educational campaigns and environmental education initiatives in the schools of developing communities.

This same Department publishes various important and widely-distributed magazines and publications that contribute to the object of promoting environmental culture. It has also printed several manuals with this same objective, such as Discover the City, *Discover Your Environment* and Turning Words into Action.

The WWF-SA is currently running about two hundred projects in South Africa, at least forty of which deal with environmental education. In 1994, WWF-SA named an environmental education coordinator, Lesley Richardson, who channels the funds that Gold Fields, the organization's star sponsor and one of the oldest mining companies in South Africa, invests for this purpose every five years. As Richardson explained, *"In the past, the WWF has helped finance education on environmental problems in protected areas, often through centers addressing children and teachers. Recently, this approach has been considerably broadened to focus on people in their environment more than on people visiting a protected area. Environmental education is dealing increasingly with the needs of communities and the way that resources are affecting their way of life, and vice-versa."*

The *Wildlife Society*, of which we have already spoken with regard to the development of conservation education in South Africa, is also involved in an entire series of projects that contribute decisively to the extension and introduction of educational programs on the environment in South Africa. Share-Net is an informal network of individuals and organizations working together to produce low-cost educational materials. The copyright is free, because of its educational purpose. "Enviro-facts" is probably one of its most popular publications.

In 1995, the *United States Agency for International Development* (USAID) announced its award of financial aid to The *Wildlife Society*, which runs wide-scale projects supporting sustainable life in disadvantaged South African urban communities, so as to promote environmental education in such urban areas.

From the business point of view, South Africa may be said to have a business sector especially concerned with environmental matters and obviously education dealing with such questions.

Most businesses finance some kind of environmental project. Gold Fields, apart from its close relationship with WWF-SA, sponsors the construction of environmental education centers (about twelve to date) owned both privately and by the State, and some of the most important projects linking the environment with cultural history, such as the Thulamela archeological site in Kruger National Park, where an educational center is being set up to stress the legendary relationship between people and nature.

Other big companies that contribute largely along these lines include Eskom (power), Sasol (oil), Shell, Total, and Nedbank (the bank that channels funds for the WWF-SA).

Most big South African companies provide their staff with recycling programs and environmental training, and a forum, ōIndustrial and Business Environmental Educationō, has recently been created. The initiative belongs to a group of people from the business sector interested in establishing an environmental ethics in the corporate world through training programs.

## CONCLUSION

The growing interest in environmental issues being shown in South Africa coincides with the most important period of political and social transition of its recent history, and consequently it introduces a plethora of uncertainties while presenting a unique opportunity to unify differing points of view and to develop management systems that enjoy the broadest possible support and legitimacy. Conservation and protection of its environmental wealth can in fact be a powerful reason for conciliation and perhaps also a splendid passport for a century in which man must side with the nature of which he is part.

Population and resources, land distribution and management, urban development and cities, and management institutions are, as we have seen, the areas that are going to be largely responsible in the environmental field for the challenges in this period of sociopolitical change in South Africa.

To these challenges, which South Africa shares with most Third-World countries, is added another important and immediate pressure to deal with in South Africa's case, and that is the legacy of apartheid. In terms of environmental management, that means special attention to the aforementioned "poverty environments" and land reform.

Though the discriminatory policy of the past adds a new factor of complexity in this country, important assets such as a promising economy, skilled labor, a historical basis for conservation, growing environmental mobilization, and of course the new opportunities offered by sociopolitical change are without a doubt providing "the new South Africa" with real grounds for becoming a fine example of conservationist and environmental management for numerous Third-World countries, and especially for Africa.

Protected areas are essential from the conservation standpoint. They ensure the survival of a vast variety of species, and at the same time they safeguard "rare" and "endangered" species and the ecosystems of which they are a part, thus satisfying our moral obligation toward future generations. Moreover, because of their extraordinary biodiversity, they are natural biology, chemistry and medical laboratories and the finest environmental and conservation education classrooms in the world.

Until the time comes when the real benefits that these areas can provide are recognized, many of them will have to either be self-sufficient or else provide tangible benefits to local populations in order to ensure their own long-term survival. This fact emphasizes the need for developing a field of "conservation economy" to provide the right sustainable tools and means for enhancing the effectiveness and fairness of this type of area.

Tourism, the second fastest-growing industry in the world after oil, can be one of these paths. Investing therefore in the conservation and development of these areas, which house a unique wildlife, is one way of creating wealth. The knowledge and skill of local populations can and should be included in the conservation, management and control programs for their areas. Their participation will make them benefit from conservation of their environment.

The process of transforming South Africa from a social model strongly rooted in injustice to another founded on equality, liberty and sustainable development is obviously not easy. Its success will depend, apart from economic factors, on the progressive development of civil society and the extension of civil, political and social citizenship within the context of a radical democracy. Environmental and conservationist policy and its extension through a proper educational policy with regard to environmental problems can play a significant role in this process as long as the right theory and practice are developed.

The inclusion of such a policy in a new unified education system in South Africa means that it can contribute to achieving the essential results the policy proposes. In addition, this means that, intrinsically speaking, without dragging with it any dead weight from the past, the policy can use the considerable experience and numerous examples of programs that, at the international level, allow local issues to be taken closer to the global scene.

The educational policy that South Africa has been developing in that direction looks to be of the fundamental solutions for stopping the deterioration of the South African environment, as a mainstay of sustainable development, and it is currently being consolidated in the formal sector of education, from which it is often extrapolated toward nonformal situations, especially toward local communities. Despite the problems that still exist before optimum results can be achieved in this type of program, what has become clear is that they are vitally important in the crucial process of integrating local communities in environmental management.

## EPILOGUE

*"Significant headway has been made toward facing environmental challenges. Yet, the environment has continued slowly to break down in all regions of the earth. The progress toward sustainable development has simply been too slow."*

*"An extensive assessment of the global environmental status is urgently needed, including the connections between environmental questions and the socioeconomic structure of life."*

*"While many attribute the current degradation of the worldÆs resources to poverty and population growth, inefficient resource use, high levels of consumption, waste generation and industrial pollution must be equally blamed."*

*"Global Environmental Outlook"*. UNEP. 1997.

These are some of the conclusions of the *"Global Environment Outlook"* (GEO), the environmental assessment process that was initiated at the demand of the Executive Council of the United Nations Environmental Program (UNEP), which in its eighteenth session of 1995 called for a new, extensive report to be drawn up on the status of the global environment now and up to the year 2015. This decision also acknowledged the need to move forward in the consensus of some essential environmental questions, and in the establishment of the recommendations of Agenda 21, the agenda for action for sustainable development. The UNEPÆs Executive Council recommended that the report include the fundamental environmental problems and threats, basic trends in environmental change, the global effects of expected economic development, population increase, and consumption and production patterns. It also stressed the inclusion of recommended action and steps, such as institutional and legal changes that could actually turn around unwelcome and undesirable tendencies.

The Earth Summit + 5 took place June 23 to 27, 1997, in New York, five years after the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in June, 1992, whose global framework for action was embodied in Agenda 21. After evaluating the progress made in those five years and the difficulties found, especially with regard to financing and the transfer of technology in developing nations, and after pinpointing new goals to pursue over the next five years, the Earth Summit + 5 adopted the Agenda for Future Application of Agenda 21, emphasizing the Agenda's current validity and the vital importance of its application for achieving sustainable development.

Africa is a great continent with many different sets of dynamics. Since the sixties, it has been experiencing serious economic and environmental trouble as well as severe periods of social and political instability. Its population growth rate, the highest in the world, has brought the total number of its inhabitants close to 700 million, which has made for added tension. Africa's poverty (21 of the world's 30 poorest countries lie in this region, according to World Bank information) has perpetuated underdevelopment and poor resource management in this region of the world. Furthermore, deterioration in terms of trade and the lack of financial resources allotted to investment have made it even more difficult for some of these countries to develop sustenance patterns that could ease the pressure on the natural resource base.

From a positive viewpoint, political liberalization is spreading throughout the continent; and although institutional infrastructures supporting the democratic process lag slightly behind, pluralism and responsibility are becoming more and more evident each day. In step with these changes, a strengthened civil society is emerging, with significant characteristics such as a free press, decentralization, respect for human rights, social justice and growing popular participation in the process of development and political decision-making.

In the midst of all this, environmental degradation continues. One of the greatest problems, common to practically all the African nations, concerns the heavy imbalance in the use of natural resources: soil and vegetation are overused, while water, energy, minerals and organic resources are sometimes under-used, or exported in bulk, which means a loss of added value that cannot be turned back to environmental improvement. Finding the balance between development and conservation, and specifically between economic development and sustainability, is one of Africa's tallest challenges. The necessary, definitive interrelationship between the two requires a consistent, integrated focus.

Various regional forums for African governments (UNECA, 1992, 1993a, 1993c; OAU, 1995; UNEP, 1996a) have identified the following top-priority environmental questions:

- land degradation and desertification problems, particularly in relationship with the need for food and self-sufficiency;
- forest protection and sustainable use;
- effective biodiversity management and protection;
- water resource management, including the water shortage problem and efficient management of scarce water;
- pollution problems, especially those affecting fresh-water systems and urban, coastal and marine areas;
- climate problems, including drought and the global weather change; and
- demographic change and the pressure population exerts on natural resources, especially in urban areas.

**South Africa**, like the rest of the African continent and the rest of the world, is also facing the environmental challenge, one of the most serious challenges in this last decade of the twentieth century. A challenge that, beyond economic, technical, social and political digressions, is basically intellectual and ethical in nature.

The political goal of achieving sustainable development in South Africa cannot be met without long-term natural resource protection, that is, by integrating conservation and socioeconomic targets. An understanding of this necessary relationship and its adaptation and practice can only be grasped by creating an educational and cultural substratum, an environmental culture, which will allow for problems and their scope to be understood and will banish forever the idea of Nature as the human beingÆs antagonist, especially in a country which, like almost all countries in the continent of which it is a part, has maintained an emblematic, uninterrupted union with Nature since humanityÆs beginning.

Lastly, South Africa, within the African context, can and must play a leaderÆs role in this and other important questions. The South African political miracle, the recently-accomplished one thousand days of Nelson Mandela in power, the amount and quality of its natural resources, its solid business structure, the impressive legislative process of democratic development, and above all, the will that the South African people display, enable it fully to shoulder this urgent task.

# Using the environment to enable learners with special educational needs (behaviour problems) to actualise their potential

***F.H. Weeks***
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> **"Systemic change is needed to enhance regional and community capacity to the point where those involved can meet all of the needs of troubling youth. True collaboration and, with it, a reorientation of our commitment to *all* children, represent our best hope for an improved future for these too-long neglected children and youth**
>
> Illback et al,1996

In the past, teachers, peers and significant others got irritated by learners with behavioural problems and thus labelled and stigmatised these learners. Those persons that could have assisted learners with their problems and unfulfilled needs, in order to enable the learners to actualise their potential to the fullest, rather withdrew and gave up on these learners. The end result was that the needs of learners, whether of a psychological nature or just basic needs like clothing, and proper food, were left unfulfilled triggering behaviour(al) problems in the classroom.

Nowadays, the focus is placed on the environment and the significant others/role players within the environment and on ***how they*** can act, so as to enable learners to realise their full potential. A complete mindshift has taken place and ***learners*** are now no longer ***the scapegoat***, creating their own misery ..... in fact, now ***the environment and significant others,*** as part of the environment, are to blame if blaming needs to be done, if learners do not fulfil their full potential.

A lot of emphasis is being placed in the new Education Policy (NCSNET,1997:10) on the fulfilment of learners' potential, making use of the environment has become a very important and crucial issue. Thus the ecological system model is being used as a frame of reference to view learners and especially Learners with Special Educational Needs (*learners with disabilities who may need to use specialised equipment or assistive devices to participate in the learning process e.g. the blind, the deaf, the cerebral palsied, learners who experience some form of learning breakdown as a result of differences in learning style or pace. For instance a learner who learns at a faster or slower pace than others in the classroom, learners with learning problems, learners from disadvantaged areas who did not previously receive the necessary education, or the gifted learner and learners who are at risk for personal and social reasons, namely a learner who is abused at home, misses school and drops out as a result or a learner who has HIV and a leaner who has behaviour(al) problems)* within their environments.

According to Inclusive Education as embedded in the new Education Policy (NCSNET,1997:10), *all* learners must be accommodated in mainstream education. Learners with behaviour(al) problems have always been in the classrooms except for those learners who were extremely difficult to deal with in the mainstream classroom. They were committed via the Children's Court to Industrial Schools or even Reformatories. The future of these institutions are at present being reviewed and no definite recommendations, as to their future role has yet been formulated. The possibility does exist thus that these learners with serious behaviour(al) problems will also be accommodated in the mainstream classroom.

Behaviour(al) problems have traditionally in the past, in comparison with learners with physical or mental disabilities, not been highlighted as an issue of concern - yet teachers at In-Service Training Workshops contend that from 10% - 60% of Primary School learners are experiencing behaviour(al)

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problems and teachers are not properly equipped to deal with these problems. If the causative factors of the behaviour problem are not attended to and the most effective method be implemented to assist these learners, they will never reach their full potential.

In this paper, the concept behaviour(al) problems will firstly be clarified, whereafter the occurrence of behaviour(al) problems as well as the relevance of the Education Policy, in terms of behaviour(al) problems, will also specifically be dealt with. In the ensuing discussion the causative factors to behaviour(al) problems and the Ecological System Model will be addressed and lastly, but not the least, the advantages of making use of the environment to actualise the full potential of learners.

## 2 CLARIFICATION OF THE CONCEPT "BEHAVIOUR(AL) PROBLEMS"

Behaviour(al) problems start to occur when the behaviour (includes many types of behaviour e.g. movement, facial expressions, attitudes, the use of language, communication with other human beings etc...) of a learner becomes problematic. It is also important to keep in mind ***who*** is evaluating the behaviour of the learner, as well as the fact according to which ***criteria*** the behaviour is judged. Thus would a psychiatrist regard behaviour in a total different way than would the lawyer or a medical doctor or a teacher.

Prinsloo (1995:7) mentions that specific norms and religious beliefs, will also have a determining impact during the evaluation of behaviour - e.g. if a learner spits at a teacher in the classroom it can be permissible in a specific culture, while within the norms of other cultures it is despicable.
Ashton & Elkins (1994:294) regard the clarification of the concept "behaviour(al) problems" as not an easy task. To them defining this specific group of Learners with Special Educational Needs is the most difficult task to complete.

Another factor which complicates the issue of clarifying the concept "behaviour(al) problems" is the fact that learners must, according to the Constitution not be treated in a inhuman, undignified way, by categorising them into different categories of Learners with Special Educational Needs.

Apter (in Ashton & Elkins, 1994:299) describe "behaviour(al) problems" as follows:

> ***"What makes behaviours disordered is when they are exhibited in the wrong place, at the wrong time, in the presence of the wrong people, and to an inappropriate degree"***

Zarakowska and Clements (1988:2) have provided the following guidelines on when behaviour has become problematic:

- the severity of the behaviour or the behaviour as such, is inappropriate according to the learner's age and level of development
- the behaviour can be regarded as being dangerous either to the learner himself or herself or to others
- the problem behaviour acts as a handicap for the learner, depriving him or her from the acquiring of new skills or from important learning opportunities
- significant stress to the lives of those who live and work with the learner, is generated by the occurrence of the behaviour problem and has a definite negative effect on the quality of their lives
- the learner's behaviour is contrary to acceptable social norms

Bower (in Morgan & Reinhart, 1991:4) stipulates that so called "behaviour(al) problems" should occur on a regular basis and for a fairly long period; the learner's academic performance must also be affected negatively. Bower (in Morgan & Reinhart, 1991:4) draws up the following profile of the learner with behaviour(al) problems:

- an inability to learn which cannot be traced back to intellectual, sensory, or health factors
- an inability to establish or maintain socially acceptable relationships with peers and teachers
- unacceptable and inappropriate types of behaviour or feelings under normal classroom circumstances

- a tendency to experience a general pervasive mood of unhappiness or depression
- to be inclined to develop psychosomatic symptoms or fears associated with personal or school problems

According to The Code of Practice of England (Farrell, 1995:8), Learners with Behaviour(al) Problems can be identified by the following guidelines:

- the learner is inclined to play truant on a regular basis
- the learner exhibits unusual and obsessional eating habits
- a dependancy on some type of addiction is present (drugs, alcohol)
- the learner tends to react unpredictable, bizarre, obsessional, violent or presents with serious disruptive behaviour
- the learner is inclined to bully other learners
- indications of a possible mental distortion can be detected

Two other factors that links up with what has been said thus far, are e.g. the fact that the learner with behaviour(al) problems are inclined to get involved with criminal acts as well as the fact that his academic performance indicates a definite decline.

The opinions of researchers can be summarised as follows:

> ***Behaviour(al) problems indicates behaviour that is unacceptable to significant other people in the environment of the learner and/or has got a destructive impact on the learner's life itself as well as the fact that it has got a destructive impact on the lives of other significant people in his environment. These learners can be regard as learners at risk for personal and social reasons***

Behaviour(al) problems can however be classified as being not so serious, mild types of behaviour problems and serious behaviour problems. Farrell (1995:6) explains the difference between the three types of behaviour problems:

***The not so serious type of behaviour(al) problems*** are behaviour problems that only occur during a certain period of time and could be attached to certain disruptive, circumstances in the learner's life. It is however of a temporary nature and can be overcome with he necessary love, interest and support.

***Mild types of behaviour(al) problems*** occur during a longer period of time and the causative factors are deeply seated. These learners need the assistance of the teacher as well as other professional persons to overcome these problems

***The more serious type of behaviour(al) problems*** is only a small percentage of learners with behaviour(al) problems. Their behaviour(al) problems can be regarded as mental disorders e.g. anorexia nervosa, child schizophrenia, or other psychotic illnesses. These learners definitely require the assistance of specialised people e.g. a psychologist.

Behaviour(al) problems can be regarded as being of primary or secondary nature; ***primary*** behaviour(al) problems indicate behaviour problems that were the original problem and triggered other problems e.g. a learner that is hyperactive and are inclined to be disruptive in class. ***Secondary behaviour(al) problems*** have occurred after a primary problem has already been established e.g. a learning problem occurred at first and later on the learner developed behaviour(al) problems because of the learning problem.

## 3 THE OCCURRENCE OF BEHAVIOUR(AL) PROBLEMS

It is difficult to determine the exact numbers of behaviour(al) problems; the following act as reasons causing this problem:

- the criteria according to which a learner is judged to be a learner with behaviour problems vary a lot.

- the fact that some learners with secondary behaviour(al) problems also experience another problem e.g. a learning problem adds to the fact that they then are being regarded as learners with learning problems instead as learners with behaviour(al) problems
- socio-economic circumstances of learners also has an impact on the presentation of behaviour(al) problems; in slum areas learners are more inclined to experience behaviour problems than is the case in more affluent areas
- circumstances at school has got a direct impact on behaviour(al) problems - some schools will thus experience more behaviour(al) problems than others
- the sex of learners can also determine the occurrence of behaviour(al) problems - boys are more inclined to experience behaviour(al) problems than girls
- the age of the group members determine the occurrence of behaviour(al) problems. According to Ashton en Elkins (1994:302) they found with research done in the U.S.A. and Australia, that more learners in the primary school phase (intermediate) experienced behaviour(al) problems than learners in the younger or older age groups

Walker et al (1995:4) mentions that behaviour(al) problems are starting to occur more frequently in schools. This fact indicates that schools are not capable enough of educating learners in an effective way as well as the fact that socio-economic circumstances are worsening which causes more learners to be regarded as learners at risk. In South Africa this situation is also present as jobs are becoming more difficult to obtain, more social problems within the homes occur (e.g. alcohol abuse, child molestation, child abuse, divorce). This situation is getting even worse with the national budget cutting back on education and welfare. Emergency Services that have been provided in the past, does not exist any more e.g social workers who were on stand by to attend to the immediate, urgent needs of families where e.g. the lives of children were in danger and where assistance was needed immediately or like in the case of a mother with five children and no food and no proper clothing, no proper accommodation and toilet facilities and no husband as he has just left her. The Child Protection Unit of the Police is overloaded with cases to attend and thus they focus on those where an injustice has been committed to a child.

Within the new, proposed Education Policy's framework of inclusive education, the occurrence of behaviour(al) problems in schools can also rise as learners that were in the previous education dispensation, referred to Industrial Schools and Reformatories, will be under one roof with other learners in the mainstream and can have a negative impact on other learners who did not experience behaviour(al) problems before and are now experiencing behaviour(al) problems e.g. gangs on the playground which forces other learners to "adapt or die" according to their norms and values; by identifying (even if it is a matter of "forced identification") with these negative role models, more learners can experience behaviour(al) problems.

## 4 THE NEW, PROPOSED EDUCATION POLICY

### 4.1 The proposed vision

The *vision* of the education policy entails the following (NCSNET,1997:10):

***" An education and training system that promotes education for all and fosters the development of inclusive and supportive centres of learning that enable all learners to participate actively in the education process so that they can develop and extend their potential and participate as equal members of society"***

### 4.2 The proposed principles

The *principles* of the education policy are as follows:

- acceptance of principles and values contained in the Constitution and in the White Papers on Education and Training (e.g. the right to equality, protection from discrimination, respect for human diversity and equal opportunities for all
- human rights and social justice for all learners
- participation and social integration (opportunities to participate in their communities must be

given to all learners, as well as the fact that they must be provided with the widest possible educational and social opportunities. Learners must learn mutual respect by means of integration)

- equal access to a single, inclusive education system (education must be organised in such a way that *all* learners will have access within a single education system)
- access to the curriculum (the curriculum must be accessible to all learners and if necessary support must be given to learners to enable them to access the curriculum effectively)
- equity and redress (barriers which excluded learners in the past from education and the general community should be overcome and they should be given opportunities to integrate into society and education as a whole)
- community responsive education system (if education is relevant and meaningful to the lives of all learners, it implies that it will prepare them for both work and life as well as to prepare them for involvement in the community)

### 4.3 The proposed future strategies

The following *strategies* are proposed for the future:

- *development of an integrated system of education* (the new education system is designed to recognise and to respond to *all* learners
- *holistic development of learners and support services* (partnerships between all stakeholders)
- *transforming the system* (the system needs to change from meeting the "*special*" needs of learners and an isolated focus on "*changing the person*"to that of a systems change approach)
- *holistic approach to institutional transformation*
- *barrier free access to all centres of learning* (disabled learners of all ages must be able to have access to and be integrated within the education system)
- *developing a flexible curriculum to ensure access* (accommodate all learners)
- *promotion of the rights and responsibilities of parents* (allow parents to take part in the planning and development of educational support)
- *promotion of the rights and responsibilities of teachers and learners* (teachers and learners should be directly part of the development process in the developing of a learning process that caters for all the needs of learners)
- *provision of effective development programmes for educators and other human resources* (educators need to be empowered by providing them with the necessary skills, knowledge and attitudes to enable them to respond to all the needs of all learners)
- *a preventative and developmental approach to support* (centres of learning should be developed in such a way as to prevent social and learning problems to act as a barrier to learning)
- *embedding support services within the system* (support services should move away from focussing on individual learners to supporting the system)
- *community-based services* (a structured community participation approach should be implemented, in order to optimise the utilisation of available sources in the community and to develop, and support education provision)

In summary, the main focus of the proposed education policy is to enable all learners to take part in the education process with the aim of developing and extending their potential, to prepare them for both work and life as well as to prepare them for involvement in the community. These aims can only be reached if all the stakeholders participate in the education process e.g. the learner him or herself, the parents, the whole school and teaching staff, the community and any other stakeholder who can contribute towards the development of the learner's potential. Apart from stakeholders taking part and doing their bit to enable the learner to become a fully actualised person, the system must also be transformed - a holistic approach and a change of the education system is needed in schools. The main aim with this change is to allow learners to learn and to grow up in a barrier free environment - thus having to attend to any matter that is handicapping the learner; as this is an enormous task, the systems approach is being applied meaning that the role players/stakeholders withing the learner's environment must, together with the learner buy in an approach where everybody is doing his or her utmost to enable the learner to actualise his or her full potential.

Another fact that must be kept in mind, is the fact that all this effort must be to the benefit of *all* learners - thus removing the stigma that has remained with learners with special educational needs - they now have the right to be treated exactly the same as all other learners are treated and can get the same opportunities. They are now being acknowledged within the mainstream education as *equal* to all other learners and thus have the same rights as all other learners. An interesting point regarding the involvement of the community is the fact that learners must be prepared in the schools for involvement as future members of the community, but the community must also not sit back while this preparation is taking place and as one of the major stakeholders/role players must be prepared to fulfill their bit as an enabler enabling the learner to fulfill his or her potential.

According to the new, proposed Education Policy (NCSNET,1996:1-45), **educators** (*a person whose work involves educating others at all levels of education, in any type of education or training context, including formal and informal e.g. teacher, lecturer, parent, youth counsellor)* and **support providers** (*people from a number of disciplines and walks of life who have different kinds of knowledge and levels of skills e.g. "Special needs" teacher, sign language interpreters, social workers, doctors, nurses, psychologists, nutritionists, community workers)*
must enable learners to:

- be treated like dignified human beings who do have certain rights e.g. not to be discriminated against, respect for human diversity
- benefit from a *'whole schools approach"* which implies that all the different role players in the learner's environment/life world should contribute towards actualising the potential of the learner
- not have to fit in with a fixed and rigid system but to rather benefit from a transformed system that is interested in accommodating individual differences among learners
- actively take part in the education process in such a way that they actualise their full potential
- become worthwhile future members of society
- become integrated within the education system and within society
- have their needs addressed and that appropriate support is provided become part of an inclusive, barrier free and supportive learning environment
- have equal access to a single education system and the curriculum

## 5 CAUSATIVE FACTORS TO BEHAVIOUR(AL) PROBLEMS

In the previous paragraph it was noted that according to the proposed new Education Policy, all the stakeholders/role players together with the learner must contribute towards actualising the full potential of the learner. It was also noted that the system must change - in other words nobody specifically is to blame any more like in the past - instead the focus is on collaboration and the making use of the stakeholders/role players within the environment of the learner.

In the past a learner's behaviour(al) problem was diagnosed and classified in terms of the cause and effect "recipe". This type of thinking is called the linear way of thinking as to be found within the medical model. Within the frame of reference of the new proposed Education Policy, a model of *multicausal* thinking is accepted. This implies that many factors can be contributing towards causing behaviour problems and that these factors are continually in interaction with each other.

In the literature many possible causative factors are mentioned. In the past, the learner was but always to blame and sometimes the parents as well or circumstances like divorce. Within the ecosystems approach, as incorporated in the proposed new Education Policy, the learner must be viewed within his total situation. This implies that attention must be given to the impact of the learner on his environment and the impact of significant other persons in his or her life and how this links up with behaviour(al) problems that the learner might be experiencing. .

The causative factors of behaviour(al) problems are divided into two groups namely those that are *intrinsic* and those that are *extrinsic*. Intrinsic factors are less common than extrinsic factors and are not regarded as one of the main causative factors to behaviour(al) problems. Most behaviour problems can be traced back to extrinsic causative factors. It is, however, notable that although a learner's behaviour(al) problems are caused by intrinsic factors such as mental retardation, and behaviour(al) problems, the situation can be aggravated by the fact that role players in the environment of the learner do not react supportive and positive towards the learners concerned. Because the learners do not get the necessary support at home or at school, his or her problems can in fact be regarded as being far worse, than those of a learner who acts disruptively in the classroom. Because of the interaction of extrinsic and intrinsic factors, it is rather difficult to always be able to distinguish whether the causative factors are extrinsic or intrinsic.

According to Carson & Butcher (1992:96 e.v.) and Morgan and Reinhart (1991:13), the following *intrinsic* causative factors to behaviour(al) problems can be identified:

- ***Genetic divergencies*** e.g. Down Syndrome, Klinefelter Syndrome, Turner Syndrome
- ***Brain damage and brain disfunction*** e.g. Cerebral Palsy, epileptic, or multi disabled learner. Brain damage occurred prenatal, during the birth process or postnatal; they are thus mentally disabled and do not always understand what is expected of them or the fact that they are lacking insight as to how to present themselves in different situations or even because of the fact that they were not taught properly how to present themselves in different social situations. These learners usually act like younger children and are because of this not always socially acceptable as people in their environment expect them to act like other learners from their age group; ***traumatic brain damage*** is yet another type of brain damage that occurred later during the learner's life e.g. because of an motor car accident that the learner was involved in or young children that knocked their heads against some object. The physical condition of brain damage does affect the learner's behaviour e.g. a primary schoolboy could have been a very bright and gifted child before the motor car accident occurred - now he is mentally retarded and his development is slower than that of his peer group
- ***different temperaments*** can influence the learner's behaviour e.g. a relaxed and contented baby in comparison to a colic baby
- ***physical characteristics*** also determines behaviour. Learners that are more attractive than others do benefit from the more positive reactions from persons in their environment. A positive reaction from the environment stimulates a positive self-image -especially during adolescence the body image is important as it is the way they present themselves to their peers
- ***Good health and the satisfaction of basic needs*** influence behaviour. If a learner does not have his basic needs (need for food, clothing and accommodation) satisfied, he is mentally unfit to actualise his potential. Carson & Butcher (1992:1100 identifies the long-term effect of the not fulfilment of basic needs has on the learner - such a learner will not physically grow properly, his intelligence will be poorer than his peers, and he will have not be able to handle stressful circumstances well; he will be deprived of a good parent/child relationship and will not receive the necessary intellectual stimulation that he should have gotten. If these basic needs are not satisfied, the learner will not be able to concentrate in class - he might even steal the food of the other learners which can have a snowball effect in the classroom and in the peer group

***Extrinsic causative factors*** are factors that are seated within the environment of the learner. Some of the major role players/stakeholders that do have an influence on the learner's life and influence his behaviour are the following:

- ***the home situation***: Montgomery (1990:131) drew up a profile of a model home situation: good relationships are maintained in the family, an established routine in the home concerning tasks to be completed, meal times etc...: the children in the home are being treated with dignity and supported as much as possible; expectations concerning each family member's behaviour are discussed with the children, children experience that their parents accept their actions, their friends, etc....children respect the parents and experience good, strong, positive feelings towards the parents - these feelings are later on in life projected into another similar relationship; Negative factors that can definitely influence behaviour in a negative way are for example: family homes where there is no harmonious atmosphere and family members are continuously fighting with each other, single parent families and the absence of a role model; parents that are too busy to pay the necessary attention to the children; an atmosphere of aggression, stress, restlessness, tension and fighting in the home; unacceptable parental styles e.g. dealing with discipline in an autocratic way; traumatic events that took place e.g. a parent that was murdered or killed in the presence of a child; learners that were placed with different care situations e.g. in foster care, in different homes; no communication amongst family members and thus no emotional involvement with each other

- ***the environment***: low socio-economic status - these parents did themselves not have a good education - they therefor cannot motivate their children to study and to attend school or they cannot get involved with the children's homework and assist them with this; parents that are working long hours and cannot return to the home when other parents return home; parents that themselves commit criminal acts and cannot act as a positive role model to the child; the presence of criminals in the environment of the child has an impact on his values and norms - quite often children are paid a certain fee and persuaded to take part in criminal acts; the exposure of children to violence; no academic stimulation is available so that a culture of learning can be established
- ***the school and the teachers are major role players in the*** environment: the school can trigger behaviour problems or prevent behaviour(al) problems from occurring; factors that are part of the school as a system are e.g. the curriculum, the school organisation, the atmosphere at school and in each classroom, the teacher; if learners get the feeling that they are important and that role players/stakeholders in their environment want to "*invest*" in them, their academic performance will improve. The opposite is also true. Teachers are role models to teachers and have a major impact on learners. Westwood (1993:41) is of the opinion that if teachers change their ways of dealing with learners, the behaviour of learner's will also change. Canter et al (1993:230 illustrates this point when he mentions......"I can't change my students' lives, but I can choose how I respond to them. I can't control what these students will do, but I can control *my responses* to make the situation better for both them and me. If all I'm going to do is yell and get angry I won't get anywhere. The way I see it, that means I need to make sure *I don't scream and yell. I need to make sure I do something different*". Morgan & Reinhart (1991:42) spoke to a teacher who after 39 years could still remember how the teacher embarrassed her in class in front of all the other learners; after all this time, the person could still feel the pangs of deep seated emotional pain and aggression towards the teacher which illustrates the impact of the teacher as a significant role player in the environment of the learner

## 6 THE ECOLOGICAL SYSTEM MODEL

### 6.1 THE PREMISES OF THE THEORY

This model was designed with a view to anticipating and counteracting the criticism levelled against previous models which did not make sufficient allowance for the environment. Both the model and its variations are associated with a number of scientists. At present it draws acknowledgement from most subject fields. To illustrate this model, a brief discussion of Bronfenner's views are discussed:

- Bronfenbrenner & Crouter (Sigelman & Shaffer, 1995:86) view the *environment* as any events or circumstances located *outside* the individual person - in other words, the *extrinsic factors* which can influence a person's development. The concept of *environment* includes a variety of environments such as the physical, educational, social, cultural and geographical environments. Each of these in turn is expanded. For example, the physical environment includes even the molecules in the bloodstream of the foetus, which reaches it via the umbilical cord and can begin influencing its development even before birth. The social environment includes all meaningful role players which might have an impact on the person's life and experiences. It also encompasses various subsystems , such as the closed family system, the extended family system, the peer group at school, the neighbourhood peer group, the church group, the soccer (netball) team, and so on. All these systems influence the development and behaviour of the learner concerned, but each also has an impact on the others

- Bronfenbrenner (Sigelman & Shaffer 1995:87) devised these systems into the following groups:

- **Microsystem.** The term *microsystem* refers to the immediate vicinity or environment of the person. A newly born baby's microsystem would, for example, consist of its parents, day mother at the creche, grandmother - or whoever - and the interaction between them. Not only is a newborn baby influenced by these persons: it also has an influence on them and their interaction

- **Mesosystem.** *Mesosystem* is an illusion to the interaction or link between the various microsystems such as the interaction between the family system, school system and peer group system. Unpleasant experiences in one system will have a ripple effect on the other systems. Thus individual learners who have had a bad experience in the home will behave at school and towards their peer group in a manner that is negative or "different" and this could have a negative effect on the interactions between all the systems

- **Ecosystem.** *Ecosystem* refers to social systems which individuals do not personally experience, but which could nonetheless have an impact on their lives. Learners might be influenced by the stress the parents are experiencing at work or the problems they are encountering in their social relationships

- **Macrosystem.** The *macrosystem* forms part of the larger subcultural and cultural context within which the microsystem, mesosystem, and ecosystem function. Culture and religion provide a frame of reference for judging behaviour and those things which are acceptable or unacceptable in specific phases of life

Bronfenbrenner (Sigelman & Shaffer, 1995:87) comes to the conclusion that the relationship between a person and his or her environment is such that the two components, person and environment, have a mutual (reciprocal) impact on each .

To sum up, the ecological system model has the following characteristics:

- the environment in which learners develop includes all the events and circumstances which impact on the learner, but on which he or she exercises an influence in return
- the environment may be divided into a micro-environment, a meso-environment and an ecological environment and a macro-environment
- there is a continuos interaction between a changing learner and a changing environment
- the cultural context within which children grow up is important because it establishes certain traditions and skills necessary for adult life. Thus, at all times, it is important to interpret the development and behaviour of learners in a cultural context

Thus the ecological system model and its variations are currently being applied in a number of scientific fields because it provides for so many different variables (influencing factors)

## 7 ADVANTAGES OF MAKING USE OF ROLE PLAYERS FROM WITHIN THE ENVIRONMENT TO ACTUALISE THE FULL POTENTIAL OF ALL LEARNERS

### 7.1 ROLE PLAYERS FROM WITHIN THE ENVIRONMENT

According to the proposed new Education Policy (NCSNET 1997:7) learners must be supported by the following persons in the learner's environment namely:

> ..."*service providers from a number of disciplines and walks of life who have different kinds of knowledge and levels of skill. They may include, among others: "special" needs teachers, Sign Language interpreters, social workers, doctors, nurses, psychologists, therapists, HIV/AIDS counsellors, career counsellors, nutritionists, child and youth workers, traditional healers, community workers, and organisation development consultants".*

If one come to analyse the above stipulation of who must be supporting a learner in the actualising of his of her potential it seems to include just everyone - starting at the ***school***, everybody must in terms of *"the wholes schools approach"* as it is incorporated within the proposed new Education Policy, be involved with the learner - thus not only those members of the teaching staff that are directly responsible for the specific learner, but everybody;

At each school a ***SEN Co-Ordinator*** (Special Educational Needs Co-ordinator) should be appointed and ***an educational support team*** should be established in order to assist the teacher with problem cases that the teacher cannot render first phase assistance to any longer. Members of this educational support team are e.g.: en educational psychologist, the SEN co-ordinator, who chairs the meeting, a remedial teacher and any other person who can contribute towards the eliminating of barriers that is keeping the learner from excelling academically as well as in other areas of his life e.g. a Social Worker from the community, a Medical Doctor, an occupational therapist, a community worker, parents, or any person from the community who can offer relevant knowledge and/or skills.

***Support Services*** as provided by an educational psychologist, a SEN Co-Ordinator, a vocational guidance psychologist, speech therapists, physiotherapists, can be offered to schools in order to help to develop and support the education system to that it can respond to the different needs of learners and the system. This type of service should also focus on the prevention of physical, psychological, social and learning problems. In addition to this, there should also be a focus on creating supportive learning environments for all learners.

***Special schools*** in the immediate neighbourhood and staff attached to those schools act as a recourse centre to other mainstream schools; staff members (e.g. the physiotherapist, the remedial teacher, the speech therapist) from the special schools act as consultants and are team members of the educational support team at mainstream schools.

***The Department of Health*** (health inspectors, District Surgeons, school nurses, dentists that operate at schools, speech therapist, physiotherapist and occupational therapist) is another important partner from within the environment of tne school/learner. ***The Department of Welfare*** with their employed Social Workers can assist families with social problems as well as to organise the community and by knowing the resources in the community, try to fulfill basic needs like clothing, housing, food, assistance in the applying for government grants etc... ***The Department of Labour*** can render a service by providing sheltered employment opportunities for those learners who are not able to compete on the open labour market.

The ***community*** as such much start to take ownership for the removal of barriers to learning in learner's lives by rendering services and by the making of members from the community available to schools and learners. The parents of learners are members of the community and yet they are also members of the so called *"school community"*. They should thus be involved at school as partners to teachers in the education of their children. Volunteers from the community e.g. mothers, grandparents, pensioners, retired teachers, students, can act as teaching assistants in the classroom or as tutors or mentors to specific learners; other members of the community who have been successful in what they are doing, can be invited to address the learners at the school and to inspire learners and act as a role model to them, farmers can invite learners to come and visit and take part in horse riding activities, etc...

***Service Organisations*** e.g. Lions International, The Round Table, Rapportryerskorps are community service orientated and definite projects can be allocated to them e.g. to start and maintain a feeding scheme in order to fulfill the basic needs of learners.

It is however necessary that the ROLE PLAYERS from within the environment of learners must be sensitised to the unfulfilled needs of learners and that they are prepared to literally "walk the extra mile" with a learner and to focus on the needs of the learner instead of their own needs. When a change in attitude has taken place, ROLE PLAYERS from within the environment will be interested in taking ownership for learners, by getting involved with these learners. The principal on the other hand must know what the school's needs are as well as individual learners' needs and then start to match up the needs with sources in the community in order to fulfil these needs (according to the new Education

Policy (NCSNET,1997:34) a ***"School Register of Needs"*** should be kept at schools .Assistance to learners has thus become a shared responsibility. The degree to which this so called *"shared responsibility"* is going to be successfully dealt with is dependent on the how much ROLE PLAYERS are prepared to get involved as well as how co-ordinated and balanced the inputs take place. It must be a joint dedication to the learners. The community must regard the learners from that community as *"their"* children in order to sacrifice personal privileges e.g. to devote spare time to rendering a service to learners-in-need.

## 7.2 ADVANTAGES OF MAKING USE OF THE ROLE PLAYERS FROM WITHIN THE ENVIRONMENT

The different ROLE PLAYERS (*the SEN Co-Ordinator and the Educational Support Team, the Support Services, Special Schools, the Departments of Health, Welfare and Labour, the community, volunteers, Service Organisations)* all have specific contributions to make in terms of their ***expertise and knowledge*** and to ***remove barriers to learning*** that might exist.

Hanko (1990:139) accentuates the importance of the ***fulfilment of needs*** once again, when he reports ......***"that attempts to meet the needs of children with learning and behaviour problems are likely to be successful only to the extent to which the needs of their teachers are also understood and met. It is a special feature of the joint problem-solving consultative approach that it necessarily focuses on both. As we shall see, this multiple focus of being able to attend simultaneously to the needs of both parties also singles it out as an effective way of supporting the supporters".*** The *needs* of teachers can be met by *the other ROLE PLAYERS within the environment* e.g. if a teacher wants to paint out her room, she can ask for donations of paint from people from within the community as well as the fact that fathers can volunteer to paint the classroom, while some of the mothers can make a new tablecloth for the teacher's table or some cushions for the book corner. On an emotional level teachers can benefit from a supportive network via the ROLE PLAYERS in the environment e.g. the social worker attending to social problems at home, while the teacher is attending to the learning situation. Other colleagues can also be a support system to the teacher, as they consult with a teacher regarding a problem situation. The teacher thus does not have to make a decision re a learner's future on her own - apart from the support and assistance from colleagues she can also rely on the support of the educational support team.

The *needs of the learners* can also be met via the input of the ROLE PLAYERS within the environment - e.g. retired teachers or educational psychologists can present a course on study methods to the learners that are not performing academically according to their potential. Volunteers from the community can act as "Big Buddies" or as "mentors" to ***learners. The community buy-in*** is thus achieved by means of their co-ownership resulting in the more effective fulfilment of the needs of learners.

***Better opportunities*** are provided for the ***learners*** due to the fact that a synergy is achieved by integrating the various individual contributions of teachers and specialist team members of the educational support team.

***The global approach*** adopted is more effective than a piecemeal approach which tends to be disjointed in practice.

***Stigmatization is eliminated*** and is replaced by a ***culture of caring and understanding***.

***The school as an entity*** gains from the team approach adopted by the school and governing body Hanko (1990:144) makes the following statement ....***" enabling a maximum number of teachers to respond more appropriately to children's individual needs and difficulties by examining and attending to their context - instead of merely looking in the child for causes - will have an effect on the school as a whole and come to influence its policies".***

## 8 CONCLUDING THOUGHTS

If the needs of the learners are not satisfied, as well as those of the teachers and other significant others within the school system, learners will not actualise their full potential. Maslow (Santrock, 1983;65) stipulates that within the hierarchy of needs, certain basic needs (e.g. physiological, safety, love and belonging, self-esteem) have to be fulfilled before higher needs like self-actualization can be satisfied. For this to take place, ROLE PLAYERS within the environment is needed.

Hanko (1990:151) underline the above statements by saying ..."***it is the essence of a learner-focussed joint problem-solving consultative approach to staff development that it aims to meet the special needs of children, their teachers and the school as a whole by identifying strengths and areas for further development".***

Cheney et al ( Illback & Nelson, 1996:63) mentions ...." ***the school became a natural part of the community, and commitment to education became a priority for staff and families. A community was created that allowed for inclusion of all stakeholders in the management of the school".*** Clearly, inclusivity in addressing the education needs of learners has become far more important than ever before. Restricted resources and escalating needs will in future place far greater emphasis on community involvement in meeting the challenges presented by learners with special educational needs. With this in mind all the relevant relevant role players within the environment of learners need to be sensitised as to the needs of learners so that are literally prepared to "walk the extra mile" with a learner and to focus on the needs of the learner with special educational needs. Without the commitment of such dedicated people it will remain an uphill struggle to realise the needs of the learners concerned.

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# Quality housing education-foundation for a new paradigm to effect responsible Environmental ethics in West Africa

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## INTRODUCATION

Invariably, the study of environmental objects, such as the floraand fauna; the atmosphere, hydrosphere, pedosphere, lithosphere,etc., is scientific in nature. Therefore, individuals who engagethemselves in the study of these objects, usually employrational, non,-philosophical and objective methods to obtaininformation on, or to gain understanding of these. Teaching ofprinciples to understand these objects are consequently couchedin scientific methodologies e.g by means of unbiased observationsand rigorous experimentations.

Environmmental studies have therefore generally been associatedwith thescience disciples, thus creating the impression at timesthat environmental education, which is the focus of environmentaleducators, is limited to the general dissemination andacquisition of scientific body of knowledge on the environment.

However, perceiving environmental education as an instrument thatcan play "an important role in generating awareness ofenvironmental problems amongst people at large, and amongstschool and university students in particular" (Park, [editor],1986), shoves environmental education, whether formal orinformal, beyond the confines of pure science, into the realmsof theology and philosophy, making it an education for life, andnot a mere intellactual pursuit (Jackson,1971), (Saarinen,1976).

This perception shift from intellectualism to pragmatism inenvironmental education becommes necessary, due to the fact that,as Blunden and others assert, "Individuals and groups relate toenvironmental problems through their perception of them "(Park,op.cit.). Obviously, such perception being essentially human, isnever devoid of personal worldviews. In this regard, masseducation on the "Environment should not be viewed only througha problem based approach; an ethical approach which develops areverence and appreciation for environment is required "(ibid).

No doubt, this consideration undergirds the role of environmentaleducation while it fosters a sense of environmental stewardshipin the world's body politic of today. It should be so, because,in order to heighten environmental consciousness amongst thegeneral populace of the nations of the world, especially of the (Narayan, 1981) must be made accessible, by means of a holisticenvironmental education.

Such an environmental education that goes beyond the confines ofscience and the laboratory, should include also the education ofindividuals, families, households and communities on theirhousing environment. The pedagogy of this type of environmentaleducation falls within the purview of housing education. In thisregards however, It must be emphasised that althoughtraditionally, housing education concerns itself with housing asa consumer product and a human activity that influences thequality of life of families as well as individuals, its scopeshould widen in the context of environmental education.

This broadened and extended scope allows housing education toreach out of itstraditional limited pedagogical terms ofreference, and be consequently enriched in its capacity, in orderto also focus on a systematic communication of basic informationabout housing as an ecological entity. This information is meantto sensitize and positively influence all stakeholders involvedwith the development and utilization of the housing environmentas such.(2)

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As studies in geography and architecture show, housing, as ahuman artifact, is a major environmental user and functions aswell as an environmental phenomenon that constitutes an importantcomponent of the natural system (Saarinen, 1976). For instance,the house and its surrounding environment, are perceived as itwere, as man's attempt to reduce the immensity and theawesomeness of thenatual environment to his anthropometric scaleand his humanity.

In this micro-niche, man develps for himself, what Andrian Nappercalls the"foraging ground and nesting place" (Farmer and Louw,1996). The house becomes more or less the microcosm of thenatural environment, the point from which the "concentric circlesof environmental forces" (Melson, 1980) radiate. All theessential commponents of the natural system, inlcuding manhimself, is found in the house: from the terra cotta, the earthmaterial of the ground in the court-yard of the house, to the airin the atmosphere in all spaces inside the house; from themineral materials in the various building components, to thepresence of solar energy on the wall and roof surfaces.

In addition, it is also observable that the housing environmentexists in a symbiotic relationship with the natural system: whilenatural forces impinge upon the performance of the house as aphysical entity, the house in turn affects, for example, both the surrounding physical environment and micro-climate by virtueof the construction and utilization of the house. As a WorldwatchPaper asserts, houses as component of "modern buildings rivalautomobile and factories as sources of harm to the environmenttoday, contributing to deforestation, air and water pollution,stratospheric ozone depletion, and the risk of global warming" (Peterson [editor], 1995).

By the same token, the housing environment provides haven forenvironmental objects such as flora (Nicholson, 1970) and fauna. A case in point to illustrate this role of the housingenvironment as a haven for some fauna such as birds, was theepisode of one of the endangered barn-owl nesting in the ceilingspace of the roof over the house of the author in 1995. Thishappened after the stray barn-owl had been persistently attackedby other birds in the vicinity, while it tried desprately in vainto nestle in the branches of the trees around the house.

Furthermore, it is the housing environment that provides thecontinuum and the ambience in which the most personal andintensive human interaction with the external-physicalenvironment begins. For most individuals and families, it is alsowithin the housing environment that the greatest quantum of timeis spent while interacting with the external-physicalenvironment.

It is at this level of the encompassing niche, that environmentalimages are most precise and are acutely related to reality forthe ordinary people. For such ordinary individuals, familiarphenomena, such as space, soil, water, flora, fauna, etc., whendiscussed in terms of glabal issues such as land management,marine and coastal ecosystem preservation etc. to addressenvironmental degradation, appear rather remote and non¬consequential.

However, when these same phenomena come up in housing relatedhuman settlements issues, such as residential over crowding,garbage disposal, sanitation, waste water and sewerage treatment,landscaping, mosquitoe and rodents control, etc., they assumemore meaning and become more relevant. Consequently, a callwithin the general populace for an environmental action toredress any such related abuse, usually may get a positiveresponse.

In light of all this, housing education appears to be the mostoptimal pedagogical means to pass on sound ecological knowledgeto the ordinary citizenry. In this regard, the broad and attimes, undefined environmental concerns for the awareness of thebody-politic can be concretised and made tangible for theindividual's response and action. By this means, the individualand the family are put in the centre of the issues ofenvironmental stewardship (Jackson, 1971), leading to thesituation, in which public concerns of the housing environment,are made as stepping stones to global environmental concerns.

From this perspective, a review of the current discussions on theneed to readjust programmes to address environmental educationin Ghana is being undertaken. The review is being pursued in thecontext of the Home Science (Economics) discipline, as it is

The initial component of this progrmme was given out in April,1997 as an under-graduate final year student project work,scheduled to be completed for examination in June, 1998 in theHome Science Department, at the University of Ghana, Legon. Theobjective of the study is to develop an appropriate pedagogy forthe improvement of current teaching of children in first cycleinstitutions in Ghana in courses related to housing and theenvironment. The intellectual stimmulations emanating from the academic supervision of the project-work, have inspired thepreparation of this paper.

In essence, the paper, based on literature review and feed-backsfrom teaching sessions in the classroom, presents a conceptualbody of principles by which housing education can be harnessed,and utilized to reinforce the emerging Ghanain and West Africaninitiatives to foster responsible environmental ethics in thelocal and national body-politic.

## COSMOLOGICAL PERCEPTION OF THE AFRICAN LIVING ENVIRONMENT

The development of this conceptual body of principles isunderpinned by theobservation that in the traditional Ghanainsoceity, both the natural environment and the built-environmentwere esteemed and regarded as integral part of the people'scosmology. This worldview manifested, and does still manifest indifferent ways amongst the various ethnic groups in Ghana.

For instance, all the seven Akan clan groups marked theirdistinctive perceptions of their respective destinies in theuniverse by means of a totem, either of a parrot, a dog or otheranimals, as an expression of their oneness with nature. Thispractice of totemism is no doubt, an indication of the Akantraditional ecological wisdom; for "Totemism generally means asense of kinship between a group of people and a particularobject or form of life..." (Farb, 1963).

A nostalgic feeling for this traditional ecological wisdomamongst Ghanains was expressed in a closing sermon of theChristian Council and the National Catholic Secretariat's 1997Home Week celebrations on the theme "The Family and ourEnvironment" as follows: "Traditionally the African, after birth,is presented to the heavens and the earth in a special outdooringceremony. Implicit in this ceremony is our acceptance that we arepart of a greater whole, part of the universe, part of creation.There is a creation spirituality inherent in our native culturewhich recognizes that the earth is our home and that it isprimarily the home of God. Our ancestors lived in intimatecommunion with the world around them, ever conscious of the voiceof the wind and of thesea, the thunder and the running stream". (Christian Council of Ghana and National Catholic Secretariat,1997).

Life as such, was perceived as a phenomenon which included notonly humankind, but the earth (Asaase Yaa) (3), what grew on itand the atmosphere from which proceeded the rains, the sun-shine,the moonlight, and the twinkling of stars. The atmosphere was nota mere physical mmanifestation of a celestial phenomenon. Ineffect, it was also regarded as the place of abode of the Creator(Odomankoma) and the ancestors, who actively participated in the affairs of the living (Appiah, 1990).

This cosmological view of the ecosystem was pervasive and forseveral generations, guided the various groups of people who hadsettled in the West African sub-region to practice a form ofsocio-economic-, and human settlement development that, untilrelatively recent times, never disturbed the local ecologicalbalance nor disrupted the environmental stability.

As Brian Walker, President of Institute for Environment andDevelopment, observes in his article on "Only One Earth" in the Ghanain Weekly Spectator of October 11, 1997, this cosmologicalview, not unfamiliar to other indegenous socities in thesubregion and other communities on the African continent, "wasbased on the concept of sustainability, producing resources whichdid not destroy the environment on which the community depended"(Walker, 1997).

However, demands of population pressures, within the context ofnational/international economic development activities, coupled with consequences of uncontrolled urbanisation, have led to theworrying scenario that depicts the sub-region together with thehuman settlements in the various countries, as centres ofenvironmental disintegration and decay (Blaiku and Brookfield,1987). The content of the question, "Do we have any explanationof the appalling and degrading sanitary conditions in our townsand cities?" posed by the Introduction to the Booklet, "TheFamily and our Environment " for the Christian Home Weekorganized by the Christian Council of Ghana and the National Catholic Secretariat, is an apt description of the state of manyhuman settlements in West Africa.

Amongst other things, this scenario has emerged as a result ofthe extensive dissolution of the collective traditional environmental ethics and values that used to guide the varioussoceities during the period the nations in the sub-region evolvedout of their traditional milieu, through the long transitionalcolonial period, into their present independent political states(Wiley and Crofts, 1994)

## NEED FOR A NEW SENSE OF ENVIRONMENTAL STEWARDSHIP IN WEST AFRICA

National Environmental Policies as well as Environmental ActionPlans in West African countries all take cognisance of the issuesaddressed by the global action on the environment according to:

" I) maintenance of the ecosystems and ecological processes essential for the functioning of the biosphere;
ii) Protection of humans, animals and plants and their habitats;
iii) Guidance for healthy environmental practices in the national development effort;
iv) Integration of environmental and socio- economic planning at all levels."

As it is asserted by the Ghanain Ministry of Environment, Science and Technology, this policy framework is put in place to "ensurea sound managemment of resources and the environment, and toavoid any exploitation of these resources in a manner that mightcause irreparable damage to theenvironment." (MEST, 1997)

In addition to this, well considered environmental action planshave been put in place to ensure that environmental problemsrelating to issues such as land management, forestry and wildlife, water management, marine and coastal ecosystems, industrialpollution, mining, hazardous chemicals and human settlements arebrought under control.

Besides informmation gleaned from the mass-media, availablereports from governmental as well as non-governmental sources,indicate that there is a serious programme of action which hasbeen set in motion in Ghana now, to assist in safeguarding theenvironment against over exploitation and degradation, so thatit can continue to support life. The Ghanaian DistrictAssemblies, as local governmental bodies, are also beginning torise to their responsibility to ensure the orderly development,management and protection of the ecologies which are locatedwithin their politico-administrative boundaries.

Amongst the number of principles which have been considered to achieve theobjectives of the Ghanaian National EnvironmentalPolicy, are public participation in evironmental decision makingand international co-operation, especially with the countries inthe sub-region. All these structural arrangements are indicationsof official sense of environmental stewardship and the commitmentto the pursuit of sustainable development in Ghana (Ghana Vision2020).

Notwithstanding these laudable national aspirations, to date, thegeneral environmental habits and practices of the population donot indicate any serious environmental awareness that cangalvanise into any meaningful public participation inenvironmental decision-making. What pertains rather is apervasive and gross defective national environmental ethos, with an accompanied lack of sense of environmental stewardship,resulting in individual and collective actions that grossly abusethe physical micro-, as well as the macro-environment.

As it has been observed, "there is an increasing concern in this country (Ghana) on the issue of environmental degradation. In

b. "galamsay" operation (illegal surface mining activities)
c. the bad habit of dropping litter anywhere.
d. bush-burning.
e. fishing with the use of poisonous chemicals. "(Ghana Christian Council, et al., 1997).

The gravity of this poor environmental consciousness wasbemoaned recently in a reported public speech delivered by theMinister of Health, in which she remarked that "for sometime now,all our major cities and towns have been struggling with theproblem of refuse disposal. " According to he print,-media, theMinister went on to say that " Ironically, we argue in favour ofplastic that has contributed to about 70 percent of refusematerial in the country which are not bio,-degradable. " (DailyGraphic, 1997). (4)

As a result of this situation, the anticipated environmentalawareness of the citizenry, with their concommitant activeinterest in environmental issues are non,-existent. This rendersnull and void, the energy within the body,-politic that couldemploy the available political structures to demand andpressurise for the achievement and realisation of those statedlaudable national environmental objectives.

Despite this rather undesireable prevailing environmentalcultural milieu, there is an acute realisation amongstgovernmental, non,-governmental organisations and some civilsoceities, of the critical need to prommote a more responsibleenvironmental stewardship at all levels within the communities of the nations of the sub,-region. As Barbara Ward asserts,environmental sustainability is "planetary housekeeping" andalthough it has international implications as the issues cutacross frontiers, it must start from the local action. (Ward,1976).

In light of the dysfunctional environmental cultural milieuprevailing in West Africa, one should percieve the emergingNational Environmental Policies and Actions (NEPAs), not as merepolitical undertakings to satisfy international conventions setby AGENDA 21. Instead, drawing inspiration from the traditional cosmological conception of the physical environment, theseundertakings are to be viewed in totality, as a culturalrenaissance, that focuses on hte goal to instil into individuals,families as well as population groups, a new respect and valuefor the environment. Such new respect and value integrated into the maral landscape of local communities, must consequently leadto an ingrained habit of practising environmental stewardship at all levels.

## HOUSING EDUCATION AS A MEANS OF EFFECTING ENVIRONMENTALSTEWARDSHIP

To bring about such a cultural shift, demands a programme ofaction that is fundamental and basic in nature. This is essential.

Therefore, this paper is of the view that the programme of actionto promote honest environmental stewardship amongst thepopulation groups in West Africa, should begin at the level oftheir domestic environment, i.e. in the house and at home.Afterall, the old adage, "charity begins at home", still holdsgood. This saying is also quite appropriate in the context ofenvironmental stewardship, which is about love for, andcommitment to the environment.

In this vein, in particular for children, the housing environmentbecomes rehearsal pitch and training grounds for the formationof relevant values and habits for the practice of meaningfulenvironmental stewardship. Such homespun values and habits whenacquired, especially by children, become more meaningful, longlasting and almost sacroscant. Hence, a positive attitude to theenvironment must necessarily begin in the housing environment,where man's experience with the environment starts and at whichthe environmental encounter is most intensive.

By this token, one is challenged to ask how environmentalstewardship oriented housing education can be fostered?Addressing the question leads to an exploration of some initial conceptual principles of a new paradigm for effecting responsibleenvironmental ethics, especially, among children and ordinarymembers of the body,-politic in
West Africa, where as statedearlier, prevails a rather low profile of environmentalconsciousness. (5)

Hence, housing education, conceived as stepping stones forpromotion of strong sense of environmental stewardship, shouldbe addressed to the following stakeholders :-

- Housing Policy,-makers; these include public and traditionalauthorities that influence decisions made on land allocation anddevelopment.
- Housing Producers: these include architects, home scientists(economists), agricultural extentionists, real,-estate developers,building materials suppliers, building contractors,

whoseprofessional activities directly impact specific sections of thephysical environment.

- Housing consumers; these include children, and adult membersof house-owner families and tenant families who occupy thedifferent types of housing units, such as tenements, compound houses, bungalows, block of flats, etc.

With these stakeholders in view, the housing education promoter,must, amongst others, focus on the new orientation towards thedevelopment and subsequent use of the housing unit as anecological entity, and on the crucial reality that the housingunit as a physical entity, has an important symbioticrelationship with the eco-system. In this regard, the keystoneissues in the programmes to be addressed are the significance ofgren architecture in housing design and building, with the concommitant harnessing of the housing unit to contribute towardsthe enhancement and replenishment of the local ecology on a

Examples for such means of employing housing units by familiesto contribute towards the enhancement of the local ecology willbe, adoption of the discipline of sorting biodegradable refusefrom non-biodegradable domestic refuse (especially plasics) forrecycling purpose; effective management of domestic biodegradablewaste for composting; house-gardening to sustain the micro floraand fauna; domestic landscaping to prevent erosion.

In order to effectively address this forcus of environmentalstewardship oriented housing education amongst the identifiedstakeholders, there will be the need to incorporate someinnovative pedagogical attributes into its programmes. Theseshould include an attribute of persuasion; an attribute ofconscientization; an attribute of politicization. The first twoof the attributes are meant to equip the educational programmesinvolved to influence the mind and the values and ideals of theindividual stakeholders with respect to the environment. Theattribute of politicization is meant to galvanize the individualstakeholder into commited and habitual positive action for thegood of the environment.

In practice, such innovative attributes can be incorporated into housing educational programmes and materials addressed tospecific group of stakeholders, by using e.g. ananse-yarns,poetry, songs, etc. (persuasion); by using e.g. differenttraditional and other religious antecedents and references (conscientization); by using awards and honours (politicization). While exploring these extended dimensions of housing education,its traditional limited scope of bringing the awareness offamilies to the need for sustaining the housing unit as animportant family resource (the consumer product approach), shouldnot be in the way of environmental educators.

Instead, its assumed wider meaning, due to its environmentalstewardship orientation (the ecological approach), should occupya high position in the thinking of environmentally mindedreseachers and teachers. In this vein, the wider meaning needsto be interpreted by environmental educators, as they confrontthe critical need to adjust their education programme to meet thedemands of the global environmental issues of today and in thenext millennium.

No doubt, the interpretation of this wider meaning shouldcertainly have implications for all environment related academicprogrammes organized in the universities found in the West Africasub-region, as these are expected to be at the cutting edge ofcreating the anticipated African ecological renaissance in thecoming years.

## CONCLUSION

Therefore, in conclusion, it is to be emphasized that theparadigm advocated aims at promoting an environmental educationfor life. This should be able to strenghten the capacity of theordinary citizen in Ghana and the other communities in the West.

By this enhanced capacity for practising environmentalstewardship, a firm foundation is put in place for the losttraditional African ecological sensibilities to be reborn. Therewill then be active incorporation of these awakened sensibilitiesinto actions that will promote the renewal or creation of localcommunities, in which, as stated in the typical Ghanain style:- " children will learn ... to love and respect nature, water, sunshine, the beauty of the night, the trees and flowers and all growing things, animals, all living things. (for)..keeping animals, making small gardens, keeping clean the environment, the simple re-cycling of waste, all help to inculcate respect and care for the earth " (Christian Council of Ghana, op. oct.)

## NOTES AND BIBLIOGRAPHY

### NOTES

1. The level of environmental consciousness amongst the generalpopulace in the countries of the West African sub-region isobserved to be on a rather low profile. In addition to negativepractices such as slash and burn method of land clearing forfarming, indiscriminate hunting of game, etc. amongst ruralcommunities, there is a widespread of environmental pollution and lack of environmental care prevalent in urban communities. Thisscenario is captured vividly in the Christian Council of Ghana'sreport or the "Individual's Environmental Stewardship", whichappeared in the " The Family and Our environment" (GhanaChristian Council, et al, 1997).
2. This focused ecological emphasis incorporated into housingeducation has been adopted by the author, an Architect and aDevelopment Planner, while teaching courses in housing toundergraduate students in the Department of Home Science at theUniversity of Ghana, Legon.
3. The perception of the Akans of Ghana of mother earth as aliving entity, is expressed in the day name, YAA, which is afamale form of a name given to one born on Saturday.
4. The prolific use of plastic bags and containers for dispensingand carrying of family food items, such as grains, fish, cookingoil, groundnut paste, water, etc. has become a menace for theenvironments of human settlements found in the West African sub¬region. In both rural and urban communities, one can observe howthese plastic bags and containers, as waste products, aregradually and steadily becoming part of the natural landscape,through careless disposal and abandonment.
5. Housing education is not only to create environmentalconsciousness but also, it is to effect changes in lifestyles ofindividuals and families, which are usually perpetuted tocontribute towards unsustainable development. For a discussionof some of such lifestyles that have to change for instance in.

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# Participatory search for eco-friendly solutions to development needs of some Namibian communities

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## ABSTRACT

People have an enormous impact on their environments, largely through attempting to meet their basic needs. Yet they will not conserve their environments unless their basic needs are being met. Therefore students of the Nature Conservation Diploma course at the Polytechnic of Namibia go out for environmental education interactions with community members. Together they explore the reasons for environmental degradation and search for more environmentally sustainable ways whereby people can meet their needs.

First the students wander around the community, looking for:
- eco-friendly activities that some community members are already implementing,
- opportunities for natural resources to be used in a more sustainable way.

Each student chooses a particular issue for their interaction. They explore how community members perceive the environmental problems related to their issue, and they make appointments for meeting the community members again during the next visit, a few weeks later. This gives them time to prepare for their interactions by learning more about their chosen issue and gathering relevant teaching aids.

During the next visit they undertake their interactions, either by role plays, exercises of Participatory Rapid Appraisal ( PRA) or demonstrations. The interactions are filmed and later shown to a wider audience, with de-briefing by the community members who participated in the interactions. Each issue is opened for discussion and community members are encouraged to undertake small-scale trials with those eco-friendly solutions that they showed most interest in.
Whenever the symptoms of land degradation are treated instead of the causes, community members are encouraged to think about how to organise themselves to tackle some of the root causes, many of which are at the policy level, either local, national or international.

## INTRODUCTION

In Africa people are "victims" of environment and environments are "victims" of people (Binns 1997). So the solution to this ever tightening spiral of environmental degradation and poverty lies fairly and squarely in people.

Development aimed at addressing poverty should be socially, economically and ecologically sustainable, and therefore it is necessary to understand, respect and utilize people's local knowledge systems (Quiros 1996). It is with this in mind that students of the Nature Conservation Diploma course at the Polytechnic of Namibia go out to learn from community members and facilitate environmental education (EE) interactions. The aims are for students to gain experience in EE and for community members to become more motivated towards developing sustainably.

Some years ago the EE interactions took place at schools, without any prior contact with the community. This made it difficult for students to adequately address the needs of the school children. At one school the students even had to change the language used in the interactions at the last minute. We only discovered upon arrival at the school that the children were still being taught in Afrikaans, while we had expected English.

Over the past three years the EE interactions have therefore taken place some weeks after an exploratory visit. This allows students to assess the needs and prepare accordingly. The past year's interactions actually took place in the same area where the students had interacted with the community

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a few weeks earlier through exercises of Participatory Rapid Appraisal (PRA) (Chambers 1992) and where Polytechnic students of the Agriculture Diploma course had undertaken participatory trials with some farmers a few months previously (Zimmermann 1997).

## METHODS

During the exploratory visit the students wander around the community and talk with community members. There are usually about 20 students per visit, but they wander around in small groups or individually. The students try to:

- understand the perceptions that community members have towards development needs in general and environmental problems in particular,
- learn how the environment was managed in the past and how modern influences have disrupted the traditional conservation practices,
- find examples of existing eco-friendly uses of resources by innovative community members or traditional conservation practices that are still being applied or modified,
- find opportunities for natural resources to be used more effectively and sustainably. Some examples of eco-friendly alternatives appear in Table 1.

Each student chooses a particular issue for their EE interaction. They may do this individually, or several students may choose the same issue but then divide the process of the interaction so that each student has responsibility for facilitating a specific part of the overall interaction. All of the interactions, including the individual ones, are discussed collaboratively so that an overall plan is agreed whereby the interactions flow in some logical sequence. Students try to address the priority needs of the community members, but sometimes students have particular interests or experiences that they see as opportunities and wish to promote through their interactions.

The students have the chance to learn from community members about their chosen issue during the exploratory visit. They also make appointments for the return visit. Then during the weeks after the exploratory visit they can further prepare for their interactions by learning more about their issue, through a variety of sources, and gathering the relevant teaching aids, or perhaps more appropriately called "learning tools" (Hagmann et. al. 1997a).

During the return visit the students facilitate the interactions, either at a school or amongst the community. The interactions can be done in different ways, the most common are roleplays (Epskamp 1989), exercises of PRA (Chambers 1992) and demonstrations. Both community members and students participate in the interactions, but the emphasis is usually on involvement by community members and facilitation by students.

A home video camera is used for filming parts of the interactions. The films are later shown to a wider audience amongst the community, and those community members who participated in the interactions provide some comments for de-briefing (Ritter 1988). The issue is then thrown open for discussion and analysis. This usually reveals the extent to which the issue is of interest to the community.

**Table 1**: Examples of common approaches to land use, and some eco-friendly alternatives

| Problem (symptom) | Common solution | More sustainable solution |
|---|---|---|
| Bush encroachment | Treat symptom<br>e.g. poison or burn bushes | Treat cause<br>e.g. rotational grazing |
| Soil erosion leading to gullies | Treat symptom<br>e.g. build walls in gullies | Treat cause<br>e.g. rotational grazing |
| Over-grazing around borehole | Sink new boreholes in areas with better grass | Close down borehole for rotational resting |
| Capped soil | Rip soil mechanically | Apply animal impact |
| Livestock being attacked by predators | Exterminate predators | Protect livestock e.g. with guard dogs, electric fence |
| Damage to fences by wild animals | Kill wild animals | Convert to wildlife-friendly fencing |
| Low soil fertility | Add chemical fertilizer | Use organic fertilisers, legumes and fungi |
| Low rainfall | Irrigate with ground water | Harvest rainwater, apply mulch and plant drought resistant species |
| Lowering ground water | Pipe in water from perennial rivers of other countries | Harvest rainwater to store in sand dams and reduce consumption, e.g. by converting to wild animals that need less water than cattle |
| Outbreak of pests | Poison the pests | Encourage predators of the pests |
| Outbreak of weeds | Plough weeds into the soil or poison with herbicide | Smother weeds with fast growing crops |
| Outbreak of livestock diseases | Build veterinary cordon fences and treat livestock | Convert to wild animals that are resistant to these diseases |
| Poor soil structure | Plough | Encourage soil organisms and perennial plants e.g. Agroforestry |
| Salinisation | Over-irrigate to drain and dump salts | Minimise soil evaporation through mulch and underground irrigation |
| Reduced availability of firewood | Burn more coal or build more hydro-electric dams | Convert to solar energy, encourage and plant more trees |
| Reduced availability of wood for fencing . | Convert to steel and wire | Convert to living fences |
| Reduced availability of wood for building | Convert to imported building materials | Convert to building with local resources e.g. clay |
| High labour costs | Mechanise | Employ living organisms |

Whenever a lot of interest is shown by community members in a particular issue, they are encouraged to undertake small-scale trials. If a demonstration was undertaken then the site where it was done may act as a demonstration site for community members to re-visit and observe the consequences. Where possible the community members are assisted in undertaking small-scale trials, such as by providing seeds of useful plants or leaflets containing relevant information. The initial contact with the community is made in partnership with an organisation that is already facilitating some or other development process within the community. This also makes it easier to follow up on activities such as small-scale trials.

Students are evaluated continuously on their performance, including how well they:
- investigate the situation,
- involve participation by the community,
- prepare for the interaction,
- facilitate the interaction and feedback,
- critically reflect on each stage of the process.

## RESULTS AND DISCUSSION

There are basically two types of EE interaction that tend to occur. One type is based upon local knowledge and promotes eco-friendly practices that are already being applied by some community members. The other type is based upon introduced knowledge and promotes eco-friendly practices that have been identified by students as being appropriate to address the communities' needs. Sometimes a local type of interaction can be followed by an introduced interaction that shows how the local practice might be adapted to make it more productive or more sustainable.

Some examples of the local type of interaction are those that promote live fencing, fuel-efficient stoves, use of traditional medicines, and control of bush encroachment through fire girdling. Some examples of introduced types of interactions are those that promote solar ovens, micro-catchments (see Figure 1), compost pit gardens (see Figure 2), and organic trenches that make use of waste water to grow useful plants. An example of a local interaction that forms the basis upon which to build an introduced interaction is a stone that is locally used for building. This stone contains some lattice structure that can hold a lot of water and nutrients, so some of it was

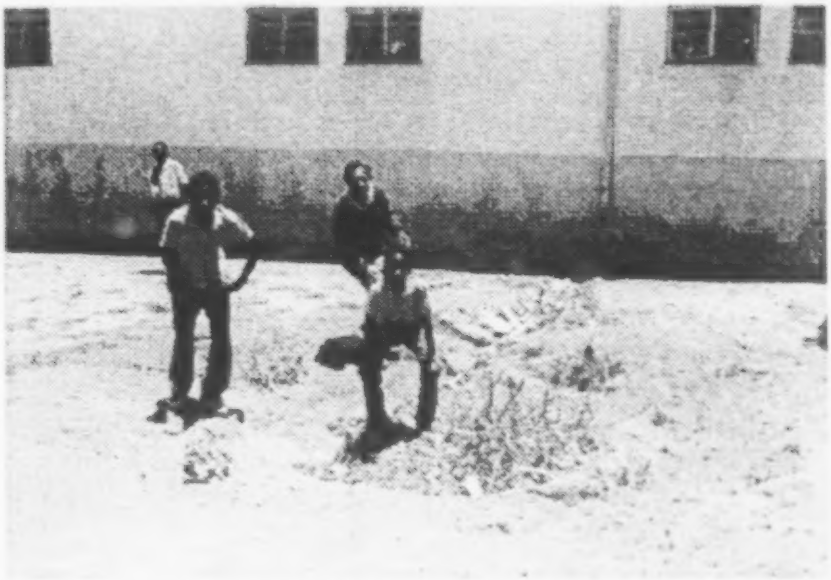

**Figure 2** A compost pit garden that gets its water from the roof of the school hostel. The pit is 1 m deep, 2 m diameter and filled with all sorts of organic matter. A variety of plants are planted around it, so that they can push some of their roots into the compost to get extra water and nutrients.

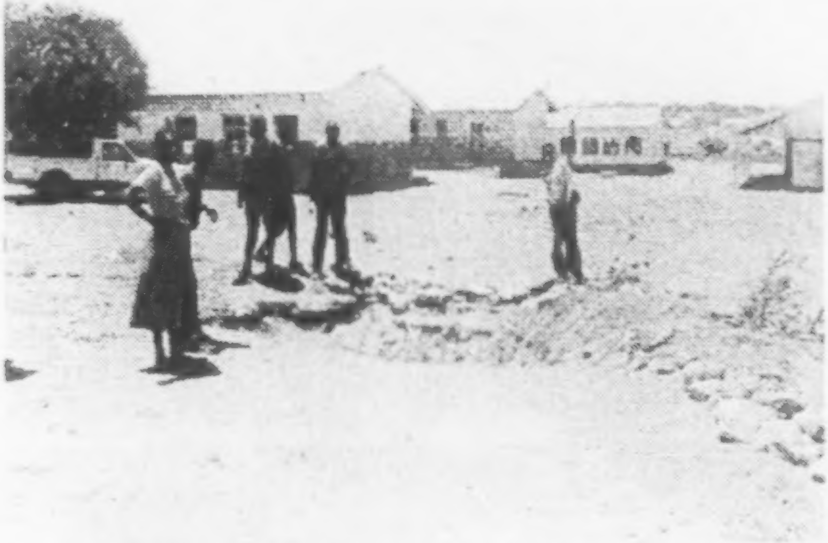

**Figure 1** The pit of a micro-catchment that harvests run-off rain water from the school grounds. Most of the water gets trapped it in the pit so that it can slowly infiltrate into the surrounding soil. Trees and vines are planted around the pit to make use of this water. Any excess water can escape over the stone spillway at the fence.

mixed with manure and soil in planting holes to see whether it can help the plants to grow more effectively, in comparison to plants grown without it.

Although there has not been any formal, quantitative evaluation to compare the different types of interaction, some qualitative observations have been noted. The local interactions usually elicit more interest and laughter during the feedback sessions, and community members who report on their efforts usually do so with a lot of pride. Critchley and Netshikovhela (1997) suggest that an audit of "good local practice" be used for EE in schools and colleges. Methods of participatory learning and action (Pretty et. al. 1995) can be a useful means to explore and promote traditional conservation practices as well as search for modern alternatives.

A film made of the EE interaction on live fencing was shown at a trade and agricultural show where it attracted a lot of interest. This type of live fencing is now included in trials being undertaken at some agricultural extension offices, although there is no evidence to suggest that the decision to implement these trials was in any way influenced by the film.

The introduced interactions generally appear to be less successful than the local ones, but they are more variable. Those that elicit little or no interest probably do not address the reality and needs of the communities. More emphasis should be put on dialogue, to attain mutual understanding of the needs and possibilities for introduced practices, rather than debate that tries convincing people of the need for a particular practice (Kersten 1997). Even if the interest of the community appears to conflict with the aims of the development organisation, it is useful to form a partnership. The development organisation is then in a better position to later help adapt technologies or find alternatives (Schmitz et al. 1997).

Many of the introduced interactions are similar to those of the Schools and Colleges Permaculture Programme in Zimbabwe (Nyika 1997). These activities, such as growing a variety of plants around the school grounds, can lead to a more conducive learning environment, and a fair amount of interest has been shown in them. However there has generally been a lack of commitment by the community in maintaining such gardens, especially in protecting the plants from damage by domestic animals. It takes only one negligent person who leaves the school gate open to allow domestic animals in, unless alternative arrangements are made for access in and out of the school grounds. More successes have been achieved with plants grown around people's homes, where community members can exert more control over domestic animals in their yards.

One of the introduced interactions that can claim to have been a success is that of promoting solar ovens. After the interaction a project was started by a cooperative whereby community members received materials and training for making their own solar ovens, in exchange for services rendered in decorating textiles.

Many of the hands-on activities that the EE interactions lend themselves to are aimed at treating symptoms of environmental degradation (such as fire girdling of encroached bushes) rather than the causes (such as grazing management). This is again emphasised during the feedback session in case it was not made clear during the interaction itself.

One reason why community members tend to focus on symptoms is that they feel powerless to address the causes. This is largely a policy issue due to the lack of effective control that communities have over many of the natural resources in communal land. Every Namibian now has the constitutional right to live in any communal area, resulting in effective open access to many natural resources largely through lack of clear legislation. A possible solution, aimed at common property management of some natural resources, might be to distinguish between the right to settle and the right to utilize resources (Kruger & Kressirer 1996). In fact Dewdney (1996) even considers the introduction of secure, exclusive tenure at the community level as the single most important policy reform needed to prevent degradation.

It is up to communities to propose policies that could eventually allow them to implement their own management of natural resources. If communities were to succeed in doing this then they could be in a position to treat more of the causes of environmental degradation. A useful tool for community members to differentiate between treatment of symptoms and treatment of causes is the "problem tree" (Fussel 1995). Its use can help identify policy constraints upon effective management and thereby motivate communities to influence policies for the benefit of natural resources and eventually themselves and the whole nation. It is not only local and national policies that influence the way in which natural resources get used. International policies also exert a big influence through factors such as finance, subsidies, consumer demand and restrictions on trade.

## CONCLUSION

The approach used in these EE experiences is still developing in response to critical reflection. It is only a small part of the overall iterative process aimed at sustainable development. This process can best be facilitated by a variety of stakeholders.. The Polytechnic of Namibia is based in the capital city and too far removed from most communities to be able to adequately facilitate the whole process on its own. Perhaps the Polytechnic's main role is to provide some initial stimulations of ideas for experimentation by community members. This is only one of the conditions given by Hagmann et al. 1997b for promotion of successful farmer experimentation, based upon experiences in Zimbabwe. The other conditions can be summarised as:

- a conducive social environment with strong local institutions,
- a high level of participation geared towards community activities,
- decision-making by households, allowing for intra-household relations,
- continuous support from extension and research institutions,
- gradual build-up of trust,
- build-up of farmers' self confidence in ability to experiment,
- basic knowledge by farmers of how to make comparisons through small-scale trials.

These conditions require ongoing facilitation that can best be undertaken by development organisations who are assisting those communities. Some Polytechnic students end up working for such development organisations and are then in a better position to carry the process further. This process is best facilitated by strong community based organisations or intermediary organisations (Martin & Sherington 1997). There is also the possibility for Polytechnic students to assist development organisations with follow-up activities during their cooperative training period of five months.

This EE approach has applied all of the five principles of professional development in EE that Heck (1994) refers to for the Landcare Movement in Australia. These are based upon enquiry, practice, critical thinking, communities and collaboration. What is lacking in Namibia is a landcare movement or something similar. This may be a longer term objective towards which the EE interactions could eventually make a positive contribution, in synergy with other partners.

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